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A COMPARATIVE ANALYSIS OF ASSOCIATE AND
BACCALAUREATE DEGREE RESPIRATORY THERAPY
PROGRAMS' PREPARATION OF GRADUATES
FOR ENTRY INTO THE PROFESSION

by

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Bachelor of Science, University of Mary, 1999
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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

In partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota

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This dissertation submitted by Christine K. Sperle in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.




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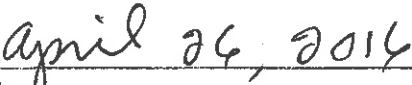


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This dissertation is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.



Dr. Wayne Swisher



Date

PERMISSION

Title A Comparative Analysis of Associate and Baccalaureate Degree
Respiratory Therapy Programs 'Preparation of Graduates for Entry Into
the Profession

Department Teaching and Learning

Degree Doctor of Philosophy

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Christine K. Sperle
April 26, 2016

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ABSTRACT

The purpose of this study was to increase the understanding of the factors that contribute to or detract from the educational preparation of graduates between associate (AD) and baccalaureate degree (BD) respiratory therapy programs through the use of graduate and employer survey ratings, Registered Respiratory Therapist (RRT) credentialing success, and document analysis of various institutional and program mission, course content, and goals.

This study employed quantitative analyses to compare the perceptions of AD graduates and their employers with the perceptions of BD graduates and their employers regarding the educational program's ability to prepare graduates for entry into the profession. Graduate and employer ratings of cognitive, psychomotor, and affective competencies obtained from the follow-up surveys from 16 BD and 88 AD respiratory therapy programs were analyzed to determine whether there were perceived differences in preparation of associate and baccalaureate degree graduates. Credentialing success data for graduates of 361 AD and 57 BD respiratory therapy programs were also analyzed to determine whether differences in program type had an effect on RRT credentialing success. Multivariate analyses of variance, Welch's F tests and Mann-Whitney two-sample test were used to analyze the data. Additional information obtained from 22 AD and 22 BD institutions were also analyzed to explore similarities and differences in mission, vision, learning outcomes and coursework.

The three most significant findings in this study were that (1) Employers rated BD graduates higher than AD graduates in the cognitive (mean ratings 4.442 and 4.256 respectively) psychomotor (mean ratings 4.508 and 4.308 respectively) and affective domain (mean ratings 4.642 and 4.496 respectively); (2) BD employer survey ratings were also higher than AD employer ratings (mean ratings 4.49 and 4.21 respectively) on the mean rating for the single item that asked graduates to rate the overall quality of their preparation for entry into the profession and (3) Findings from the document analysis revealed that BD programs required courses beyond the minimum general education, prerequisite and RT course requirements. Thus, the results of this study support the “2015 and Beyond” recommendation that the BD be the minimum entry-level education required for entry into the profession.

CHAPTER I

INTRODUCTION

The primary purpose of respiratory therapy educational programs is to prepare competent respiratory therapists for practice across multiple health care settings. This means programs must supply students with the knowledge and skills needed to practice safely and effectively in today's complex health care arena. The Bureau of Labor Statistics (BLS, 2013) defines entry-level education as the minimum level of education needed to enter the occupation/profession. Currently, the minimum entry-level educational requirement to become a respiratory therapist is the associate degree.

Entry-level respiratory therapy educational programs in the United States are offered in various settings including technical and community colleges, as well as four-year colleges and universities. To date, there are 371 (84.7%) associate, 61(13.9%) baccalaureate, three entry-level masters, and five post-graduate degree programs in the United States (Commission on Accreditation for Respiratory Care [CoARC], 2014). Thus, associate degree (AD) programs provide the most common path to obtain entry-level education for respiratory care. While associate degree programs (BD) tend to focus primarily on producing clinicians for practice, baccalaureate degree programs seek to prepare leaders for the profession by providing the student with extended opportunities to develop critical thinking skills (Barnes, Kacmarek, Kageeler, Morris, & Durbin, 2011).

As a profession matures, the level of education typically increases in response to the level of practice and to societal needs (Coalition for Baccalaureate and Graduate

Respiratory Therapy Education [CoBRGTE], 2014). Given the important role educators play in the education of future respiratory therapists, it is vital that educational programs evaluate their curriculum to determine whether the education they are providing to their students is meeting the expanding needs of the public and the profession. Data are needed to determine whether differences in knowledge, skills and attitudes exist between associate degree prepared and baccalaureate degree prepared graduates. Such information is crucial for curriculum planning and policy formation in respiratory therapy education, and to support a rationale for the transition to the baccalaureate degree.

Background of the Study

In the United States, the minimum entry-level educational requirement to become a respiratory therapist is the associate degree. However, government agencies, legislators, and third party payers all use the baccalaureate degree as the minimum education level that differentiates professions from technical groups (Barnes, Kacmarek, Kageler, et al. 2011). Given that most respiratory therapists are trained at the associate degree level, services outside the hospital setting are not reimbursed under current Medicare and Medicaid guidelines. The inability of respiratory therapists to provide care outside the hospital setting may have a deleterious impact on patient care and associated health-care costs, even as the 2010 Patient Protection and Affordable Care Act promotes the provision of patient care in lower-cost environments, such as the home (Barnes, Gale, Kacmarek, & Kageler, 2010).

Recently the American Association for Respiratory Care (AARC) hosted a series of conferences titled “2015 and Beyond” to help ensure the competency and future of the respiratory therapy workforce (Kacmarek et al, 2009). Conference members, selected by

the AARC Executive Director, represented various stakeholders in the profession, such as employers, employee groups, professional associations, state and federal government agencies, education institutions, health-care delivery systems, and the public. One of the recommendations that emerged from the final conference was that the baccalaureate degree entry-level for respiratory therapy education should be phased in by the year 2020 (Barnes, Kacmarek, Kageeler, et al. 2011). Although the recommendations from the AARC's "2015 and Beyond" conferences provide a basis for advancing to the baccalaureate degree for entry-level education requirements, many individuals are skeptical of the need for the increased education requirements. Additionally, there is no empirical evidence to support that baccalaureate prepared graduate's function more competently than associate degree prepared graduates.

This shift toward higher degrees parallels similar movements in other allied health professions. Speech therapy (ST), physical therapy (PT) and occupational therapy (OT) require the minimum of a master's degree to enter practice; both PT and OT are moving to the entry-level doctoral degree in the near future (CoBRGTE, 2014). A review of the literature from other health care disciplines suggests that graduates with advanced degrees are more likely to demonstrate professional behaviors, critical thinking skills, and effective communication skills (Blegen, Vaughn, & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994). Additionally, a study comparing academic degree and patient outcome data has shown decreased mortality rates in institutions employing a higher percentage of baccalaureate-prepared nursing staff (Aiken, Clarke, Cheung, Sloane, & Silber, 2003). Raising the entry-level education of respiratory therapists to the baccalaureate degree may provide similar benefits to patients. While there has been considerable research

comparing the competencies of associate and baccalaureate degree graduates in other disciplines, there is a substantial gap in the literature regarding the influence of academic degree on entry-level competency of respiratory therapists.

Statement of the Problem

The field of respiratory therapy (RT) has grown in scope and technical complexity over the last 40 years; however, the associate degree remains the minimum educational standard for entry into practice. Therefore, there is an educational gap between respiratory therapists and other bedside healthcare professionals. The advanced roles and responsibilities, such as critical thinking, leadership and communication skills, required in today's complex health arena suggests the current education structure for entry into the RT profession may no longer be sufficient (Barnes, Kacmarek, Kageeler, et al. 2011; Blegen, Vaughn, & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994).

Proponents of the baccalaureate entry-level requirements argue that the expanding development of respiratory therapy practice has far exceeded its task-oriented roots, necessitating a move to at least the baccalaureate degree requirement. (Beachey, 2012). On the other hand, those opposing the transition contend that moving from the associate degree to the baccalaureate degree may create major workforce shortages due to program closures (Dulle, 2012).

As the curricular requirements to prepare respiratory therapists expand, it will become more difficult to prepare entry-level therapists with the knowledge, skills and attributes needed to enter today's workforce in the confines of a two-year program (Barnes, Kacmarek, Kageeler, et al. 2011). In fact, many associate degree programs have already increased from two years to three years in order to meet current needs and

prepare students to pass licensure examinations (Barnes, Kacmarek, Kageeler, et al. 2011). The award of only an associate degree for three years of coursework is unfair to students in these expanded programs (Barnes, Kacmarek, Kageeler, et al. 2011). While it is conceivable that associate degree graduates will develop the technical competencies required for practice and are capable of passing credentialing examinations, the time program faculty must devote to teaching the skills required for practice as well as the content of the credentialing exams may hinder their ability to address professional, non-technical competencies required for clinical practice.

The ongoing controversy concerning entry-level education for respiratory therapy practice is based on whether or not the baccalaureate degree minimum requirement is needed if graduates from associate and baccalaureate degree programs possess the same levels of clinical technical proficiency. The precise nature of the differences between associate and baccalaureate degree programs' ability to prepare graduates with the competencies required for practice in today's complex health care environment creates the need for assessment approaches that produce reliable and valid indicators of program success. Research has shown that graduate and employer surveys are useful for assessing educational gains from the perspective of the employer and the perspective of the graduate, thus providing both formative and summative assessment of the program (Banta, Lund, Black, & Oblander, 1996). Additionally assessment that features multiple sources of evaluative data has the advantage of yielding a more comprehensive assessment of a program.

Conceptual Framework

In order to produce competent respiratory therapists, education programs must possess certain functional components: students, faculty, curriculum and clinical resources. As such, the conceptual framework underlying this study was based on the DeLapp's (1979) systems approach to education which looks at inputs, processes, outcomes and the environment as the variables that impact respiratory therapy education program development, design and evaluation (see fig. 1). The relationships between the parts of the system emphasize the outcomes or competencies that graduates will demonstrate. These competencies reflect a combination of skills related to the cognitive domain (knowledge), psychomotor domain (demonstration of skills) and affective domains (attitudes and values) (Huitt, 2007). Therefore, the attributes of the students (inputs), qualities of the faculty, and the characteristics of the curricula affect the educational process and subsequent effectiveness of the programs ability to prepare its graduates with the competencies (outcomes) required for entry into practice (McIlrath & Huitt, 1995). Environmental factors include those variables outside the education process that have an impact on student and teacher characteristics, characteristics of the curricula and effectiveness of the program (Huitt, 2007; McIlrath & Huitt, 1995).

Inputs

According to DeLapp (1979), inputs include the characteristics, traits, skills, talents, abilities, experiences, and capabilities that students bring to the program. Inputs are typically assessed prior to acceptance into a respiratory therapy education program. Criteria evaluated during the admission process traditionally consist of cognitive measures such as high school and/or college transcripts, standardized college entrance

examination scores, overall college GPA and/or overall science GPA. Non-cognitive measures such as reference letters and admission interview scores have also been used to assess the affective abilities of program applicants. Providing admission committees with sound admission guidelines may ensure the acceptance of students who are most likely to succeed in the program and pass licensure examinations.

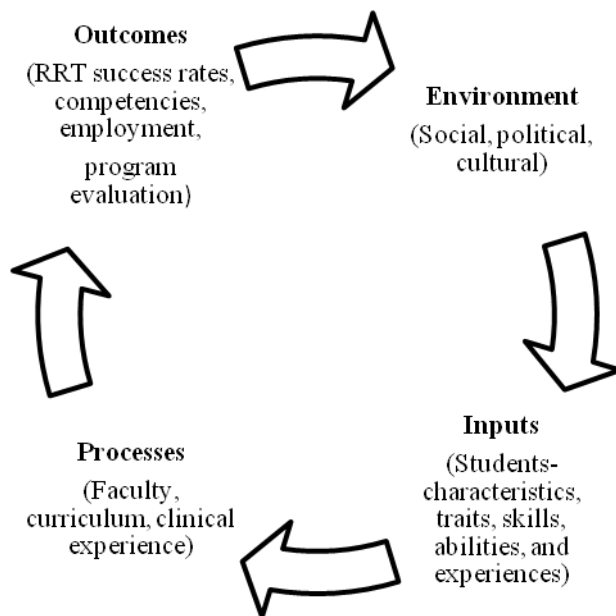


Figure 1. DeLapp's Systems Approach Model

The multiple educational pathways (associate, baccalaureate, and master's entry) into the profession of respiratory therapy profession affect the criteria used for admission selection. Unlike medical schools, which have standardized premedical admission criteria and examinations, pre-respiratory therapy admission criteria vary from program to program and are primarily dependent on the type of degree offered (associate or baccalaureate) and/or institutional admission requirements. A study by Wettstein, Wilkins, Gardner, and Restrepo (2001) found a significant correlation between a vigorous

science background and Watson-Glaser Critical Thinking Appraisal scores in senior respiratory therapy students. Since respiratory therapy is a problem-solving profession requiring critical thinking skills and a rigorous science-based curriculum is indicative of a student's problem-solving ability, it is likely that the use of science GPA may be the most useful indicator of success in respiratory therapy programs.

Processes

Processes represent all components that make up or support teaching and learning used to prepare students for entry into practice (Huitt, 2007; McIlrath & Huitt, 1995). For the context of this study, processes transform inputs (students) into some altered form of outputs (graduates) with specific outcomes (competencies) required for entry into the profession. Factors that influence program outcomes include the content and duration of the respiratory therapy curriculum; the quality of program faculty and instructional methods utilized; and the quality and variety of clinical experiences available to students.

Outcomes

Program outcomes are statements that describe what learners will be able to know and do when they graduate from an educational program (Bresciani, 2006). Respiratory therapy program outcomes are measured by the attainment of certain standards mandated by the Commission on Accreditation for Respiratory Care (CoARC). The CoARC (2010) and its sponsoring organizations collaborate to establish, maintain, and promote the educational standards of quality outlined in the *Accreditation Standards for the Profession of Respiratory Care* – to ensure accredited programs prepare graduates with the professional competencies required to practice safely in the health care environment. Standard 3.01 of the *Standards* requires that all accredited programs have the following

goal defining minimum expectations: “To prepare graduates with demonstrated competence in the cognitive, psychomotor and affective learning domains of respiratory care practice as performed by registered respiratory therapists” (CoARC 2010 Standards, p. 19).

CoARC (2013) defines competence as the knowledge, skills and values required for new graduates to begin the practice of respiratory care. According to Epstein and Hundert, (2002) competence in the health care setting evolves from a foundation of basic clinical skills, scientific knowledge, and interpersonal skills. Competencies are largely contextual and reflect national and professional stakeholders (Gruppen, Mangrulkar, & Colars 2010). Therefore, it is difficult to determine the success of the graduate and the educational program without evidence of competency in the health care setting.

Cognitive skill refers to the ability of an individual to gain meaning and knowledge from experience and information (Anderson et al., 2001). Cognition is more than simply learning information; it is the ability to think about new information, process and speak about it and apply it to other novel situations. Psychomotor or technical skills consist of the physical and mental skills and abilities that are job specific, and consist of a particular skill set or proficiency required to perform a specific job or task. Behavioral (affective) skills consist of observable and measurable behaviors and personal characteristics that contribute to an individual’s success in a specific job or profession (Merriam-Webster, 2014).

The two most important educational goals in higher education are to stimulate the retention and transfer of knowledge (Anderson et al., 2001). In other words, students should remember what they have learned and be able to make sense of and be able to

integrate new knowledge with existing knowledge. The ability to use what was learned to solve new problems, answer new questions and/or facilitate learning new subject matter signifies meaningful learning – knowledge construction in which students seek to make sense of their experiences (Anderson et al., 2001). In constructivist learning, students actively engage in the process of constructing meaning, paying attention to incoming information and organizing that information into a coherent representation. The constructivist framework requires instruction to go further than rote learning and assessment that goes beyond simple recall or recognition of factual knowledge. Therefore, when the goal of instruction is to promote transfer, outcomes should utilize cognitive processes that go beyond remembering such as interpreting, clarifying, differentiating, organizing, critiquing, designing and explaining.

Critical Thinking Skills

The medical, nursing, and allied health professions literature has given much attention to fostering critical thinking skills in graduates as processing information and making decisions are at the center of clinical practice (Bartlett & Cox, 2002; Castledine, 2010; Goodfellow, 2001; Swinny, 2010; Wettstein, et al., 2001). Today's healthcare practitioners must be able to synthesize knowledge in new and innovative ways in order to provide high quality care to their patients. The ability to reason through and respond appropriately to a patient's condition that can change rapidly requires quick and confident integration of knowledge and skills. Benner, Sutphen, Leonard, and Day (2010) found that to act appropriately, clinicians need a sophisticated understanding of physiology, pathophysiology, chemistry, physics and microbiology, as all these courses are relevant to patient care. They also found that knowledge from other subjects allowed clinicians to grasp the medical implications, detect subtle changes in a patient's condition, manage

time constraints, and master increasingly complex technical skills (Benner et al., 2010). VonGlaserfeld's (1989) work makes a distinction between training (acquisition of skills) and learning (active construction of understanding). He theorized that although training was appropriate for certain learning activities such as the development of a technical skill, these activities were likely to produce superficial versus deep understanding. Therefore, the focus on acquisition of technical skills may no longer be sufficient to function in today's complex health care delivery systems.

Mishoe (2003) developed a foundational framework for critical thinking in the profession of respiratory care. Her research on critical thinking described seven specific skills that encompass the reflective, communicative, practical and experiential aspects of critical thinking. Mishoe's (2003) research parallels that of Dewey (1933) who described higher order thinking skills as a structured chain of events that moves fluidly from reflection to inquiry, to critical thought – the entertaining of some theory that will account for the problem at hand – to a conclusion that can be substantiated. However, the “data at hand cannot supply the solution; they can only suggest it” (Dewey, 1933, p.15). Therefore, experience and practice are also necessary to arrive at a substantiated solution to the problem. Without corresponding experience, “confusion remains mere confusion” (Dewey, 1933, p. 15). According to Mishoe (2003), clinical decision-making can be improved by increasing content and procedural knowledge, by enhancing evaluation skills, and by learning to analyze and assess research.

Creating learning environments that emphasize the ability to pose clear and precise questions, identify assumptions, detect ambiguities, understand the tenets of evidence-based medicine, remain relevant to the issue, look for viable alternatives,

withhold judgment, cope with parts of a complex whole, construct criteria for an answer, and analyze arguments to come to appropriate conclusions, are vital for fostering students critical thinking skills (Jones, 1992). Additionally, an educational environment that places value on problem solving rather than simply knowing the “right” answers may assist in the development of students who are critical thinkers. Research has shown that the best predictors for success in allied health education programs include a greater percentage of faculty with doctoral degrees, abundant hands-on clinical hours with high quality clinical experiences and highly engaged clinical preceptors (Johnson, 2001; Ludwig, et al, 2010; Maring & Costello, 2009; Mohr, Ingram, Hayes, & Du, 2005).

Environment

The environment includes variables that can influence and modify students and learning processes that may or may not be controlled by the educators or the program (Huitt, 2007; McIlrath & Huitt, 1995). For the purpose of this study, environmental variables include institutional missions and values, accreditation standards, and expectations of employers, the profession, and society. Therefore, programs design curricula consistent with outcomes that are determined by accrediting bodies and expectation of employers and society. Although CoARC has established educational standards of quality to ensure accredited programs prepare graduates with the professional competencies required to practice safely, it is ultimately up to the program and the education institution to produce and organize the curriculum to meet the minimum standards of quality required for accreditation. Lack of specific requirements for curricular models has resulted in considerable variation in the types of the degree and

overall program curriculum design in respiratory therapy education (Barnes & Ward, 2009).

The diverse range of respiratory therapy programs and multiple educational entry levels into the profession has led to prerequisites and curriculums that differ from program to program. As such, it is reasonable to assume the quality of graduates from these different programs may vary significantly. For example, research shows that students who choose to pursue a bachelor's degree, as opposed to an associate degree in nursing, have the advantage of learning more and in greater depth (Benner et al., 2010). The general education courses that are part of a baccalaureate degree curriculum typically consist of a range of courses that provide students with a strong foundation in liberal arts (humanities, natural sciences, and social sciences). Therefore, students are provided with greater opportunities to improve their communication skills, develop higher order thinking skills, and acquire the knowledge and skills necessary to work independently and foster life-long learning. Higher order thinking skills include the critical, logical, reflective, metacognitive and creative thinking skills that are activated when individuals encounter unfamiliar problems, questions or dilemmas (Benner et al., 2010). They encompass the skills defined by Bloom's taxonomy as well as the hierarchy of learning capabilities and the dimensions of thinking proposed by Gangé and Marzano (as cited in King, Goodson & Rohani, 2008).

Program Assessment

When assessing accreditation status, CoARC evaluates multiple outcomes, including graduate performance on the national credentialing examination for entry into practice, programmatic retention/attrition, job placement, cognitive, psychomotor, and

behavior skills (CoARC, 2014). Currently CoARC does not require separate curriculum standards for entry-level associate, baccalaureate or master's degree programs. Therefore, all accredited programs are assessed by the same outcome standards. Furthermore, graduates from accredited respiratory therapy programs, no matter which educational degree was earned, are eligible to take the registered respiratory therapy (RRT) credentialing examinations.

Graduate and employer surveys are self-report instruments in which the respondents are asked to rate the program's educational preparation of students in three competency constructs: cognitive skills, psychomotor skills, and affective skills. According to Banta, et al. (1996), the use of graduate and employer surveys can demonstrate the existence of connections between educational and work environments. The CoARC graduate and employer surveys were developed and evaluated by several experts in the field to provide an opinion or rating on the extent to which each question was constructed to measure the programs educational preparation of students in the cognitive, psychomotor, and affective domains. The CoARC requires respiratory therapy programs to use its standardized graduate and employer surveys for the annual review of all accredited respiratory therapy programs in the United States. To maintain accreditation, the program must achieve a minimum overall rating of "3" on a 5-point Likert scale on both the graduate and employer surveys (CoARC, 2010).

To date, no studies have been conducted comparing associate degree or baccalaureate degree program outcomes using results from graduate and employer surveys. Differences in the results of employer and graduate surveys may help justify the transition to the baccalaureate degree for entry into the profession.

Purpose of the Study

The purpose of this study was to increase the understanding of the factors that contribute to or detract from the educational preparation of graduates between AD and BD entry-level respiratory therapy programs. This was achieved by a comparison of associate degree and baccalaureate degree graduate and employer survey ratings, which are mandated by CoARC and reported annually by all accredited respiratory therapy programs for accreditation purposes. Credentialing success was also evaluated to see whether differences in program type had an effect on the percentage of graduates obtaining the Registered Respiratory Therapy Credential. Similarities and differences in the purpose of and course content required for the two program types were also assessed.

Research Questions

The following research questions were investigated in this study.

1. Is there a difference between associate degree and baccalaureate degree respiratory therapy education programs' ability to prepare graduates with the competencies required for entry into the profession in regard to:
 - a) Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC graduate surveys?
 - b) Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC employer surveys?

2. Is there a difference between graduate and employer perceptions of the educational program's ability to prepare its graduates with the cognitive skills, psychomotor skills, affective skills required for entry into the profession?
3. Is there a difference between associate degree and baccalaureate degree respiratory therapy programs' ability to prepare graduates with the competencies required for entry into the profession in terms of credentialing examination success as reported by the CoARC?
4. What are the differences between associate and baccalaureate degree programs with regards to mission, course content, and goals?

Significance of the Study

Wherever they practice, respiratory therapists are expected to participate in the development, modification and evaluation of patient care plans, disease management, and patient education. The continued growth and advancement of the profession and the expectations placed on respiratory therapists (RTs) will require that every respiratory therapist demonstrate an advanced level of critical thinking, assessment and problem solving skills. These skills are essential in today's health care environment to not only improve quality of care, but also to reduce inappropriate care, readmissions and to control costs.

While considerable research has been conducted concerning academic degrees in other disciplines (Blegen, Vaughn & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994), very little literature exists specific to the adequacy of respiratory therapy

educational preparation. The results of this study may provide insight into areas of concern and controversy associated with entry-level education in respiratory therapy.

Benefits of the Study

The AARC President recently shared his goals with the association membership, outlining his vision for his two-year term in office (AARC, 2014b). One of his goals is to ensure that future students develop the knowledge, skills and attributes needed to enter today's workforce by requiring the baccalaureate degree for entry into the profession. The results of this study may clarify the debate over entry-level respiratory therapy educational requirements and help justify the transition to the baccalaureate degree as entry into the profession.

Delimitation of the Study

This study will be delimited to the 2013 graduates of associate and baccalaureate degree programs that use the DataArc Education Service Provider for automated CoARC employer and graduate surveys.

Limitations and Assumptions of the Study

The results of this study will be subject to the following limitations:

1. Employer and graduate surveys are administered six months to one year after graduation; therefore results may reflect knowledge, skills, and attitudes obtained in the workplace rather than the effects of academic preparation.
2. Survey responses were recorded on a five-point Likert scale, which does not allow much room for significant differences between ratings for entry-level education type ("ceiling" effect).

3. Employer-perceived ratings were subject to bias and may be based more on the graduate's cooperative behavior than on professional competency.
4. Graduate-perceived ratings were subject to bias and may be affected by feelings of loyalty or gratitude to faculty.
5. Survey results were limited to programs that use the DataArc Education Service Provider for automated CoARC employer and graduate surveys.
6. Credentialing examination success was measured as the percentage of students, within a three year period, attaining the Registered Respiratory Therapy credential due to the inability to obtain individual scores.

The study was conducted under the assumption that employers and graduates were sincere and honest in their perceived ratings on surveys.

Definitions

Associate degree – Completion of this degree usually requires at least two years but less than 4 years of full-time academic study beyond high school (Integrated Postsecondary Education Data System [IPEDS], 2014).

Baccalaureate degree – Completion of this degree generally requires at least four years, but not more than 5 years, of full-time academic study beyond high school (IPEDS, 2014).

Behavioral skills – Observable, measurable behaviors, knowledge, skills, abilities, and other characteristics that contribute to individual success in a specific job or profession e.g., teamwork and cooperation, communication (Merriam-Webster, 2014).

Cognitive skills - Observable, measurable abilities to gain meaning and knowledge from experience and information. Cognition implies the ability to think about

new information, process and speak about it and apply it to other novel situations (Merriam-Webster, 2014).

Competency - the capability of an individual to apply or use a set of related knowledge, skills, and abilities required to successfully perform "critical work functions" or tasks in a defined work setting (Merriam-Webster, 2014).

Credential –a verification of qualification or competence issued to an individual by a third party with the relevant authority or jurisdiction to issue such credentials, e.g. an occupational association or professional society. A credential is required in order to work in certain industries or occupations and typically requires the passage of a credentialing examination (National Center for Complementary and Integrative Health [NCCIH], 2014).

Entry-level education – is defined as the minimum level of education needed to enter the occupation/profession (CoARC, 2014).

License – a government granted permission issued to a health care professional that is required in addition to other credentials. Licensure is intended to set minimum professional standards and ensure safety and quality of work. It is defined by laws and regulations and is time-limited – i.e. it must be renewed based on meeting ongoing requirements to maintain the license. Violation of the terms of the license can result in legal action (NCCIH, 2014).

Non-technical skills – the cognitive and interpersonal skills that support effective team work. Non-technical skills include the interpersonal skills of communication, leadership, functioning as a team member, and the cognitive skills of critical thinking, problem solving and task/time management (Merriam-Webster, 2014).

Psychomotor skills - physical skills such as movement, coordination, manipulation, dexterity, grace, strength, speed; actions that demonstrate fine motor skills such as the use of precision instruments or tools (Merriam-Webster, 2014).

Technical skills – the physical and mental skills and abilities that are job specific and consist of a particular skill set or proficiency required to perform a specific job or task (Merriam-Webster, 2014).

CHAPTER II

REVIEW OF THE LITERATURE

Respiratory therapy is an allied health profession that specializes in the treatment and prevention of acute and chronic dysfunction of the cardiopulmonary system (AARC, 2014a). Allied health professionals are involved with the delivery of health related services pertaining to the identification, evaluation, treatment, and prevention of diseases and disorders, dietary and nutrition services, and rehabilitation and health systems management. Allied health includes professions such as dental hygiene, dietetics, medical technology, occupational therapy, physical therapy, pharmacy, physician's assistant, respiratory therapy, and speech therapy (Association of Schools of Allied Health Professionals [ASAHP], 2015).

The field of respiratory therapy has grown in scope and technical complexity over the last 40 years in response to changing workplace requirements. Today's respiratory therapists are expected to manage all aspects of the care of patients with cardio-respiratory problems (AARC, 2014a). In order to do so, respiratory therapists must be trained to utilize critical thinking, patient assessment skills, and evidence-based guidelines to develop and implement effective care plans, patient education and disease management programs (Kacmarek et al., 2009).

Since the establishment of the first respiratory therapy training schools, the academic level and length of programs have increased. In the early 1960s, certification programs

for respiratory therapists consisted of a 12-month curriculum for entry into the profession (Edge & Mathews, 2012). By 1967 the minimum length of formal respiratory therapy education programs was set at 18 months; however, an academic degree was not required for entry into the profession (Edge & Mathews, 2012). In 1981, the recommended minimum education level for professional practice was increased to two years (Dunn, 2013; Ward, 2012). Twenty years later, CoARC mandated that all respiratory therapy education programs award graduates an associate or higher degree upon completion of the program and that programs be located in or sponsored by a post-secondary academic institution (Dunn, 2013; Ward, 2012). Currently, the associate degree remains the minimum education standard for entry into practice, however, bachelor's level and master's level entry-level programs exist in the United States.

Content and Duration of the Degrees and Curriculum

Associates Degree

The U.S. Department of Education defines an associate degree as an award that normally requires at least two but less than four years of full-time equivalent college work (IPEDS, 2014). The associate's degree may be awarded by a community, technical or vocational college or by a four-year college or university, and consists of numerous types. The most common associate's degrees are the associate in arts, associate in science, and associate in applied science. The organization, structure and number of credits required for each type of associate's degree are highly variable. The American Association of Community Colleges (AACC, 2014) emphasizes the following curriculum guidelines in regards general education requirements:

- 75% of the work required for the associate's degree must be in general education;
- 50% of the work required for the associate in science degree must be in general education;
- 33% of the work required for the associate in applied sciences must be in general education.

The mission and philosophy of most four-year colleges and universities place strong emphasis on the liberal disciplines, professional competence, leadership and service to the community. In contrast, the main mission of junior, technical, community, and vocational colleges focuses on providing open access and affordability to those seeking post-secondary credentials (AACC, 2014). Although the traditional emphasis of community colleges focused on a liberal arts education, the post-World War II manufacturing boom and the establishment of the GI Bill has led to an emphasis focused on workforce development needs (Thelin, 2011).

The community college is the most common institution granting an associate degree and is a common path for entry into the allied health profession. According to the American Association of Community Colleges (AACC, 2015), community colleges award more than 750,000 associate degrees annually. As of 2013, bachelor's degrees were also awarded by 125 community colleges. The average annual tuition and fees for community college was \$3,347 compared to \$9,139 for 4-year colleges and universities, making them more affordable and a vital component of the community where they are located (AACC, 2015).

Respiratory Therapy Associate Degree Curriculum

Associate degree programs provide the most common path to obtain entry-level education for respiratory therapy. However, the curricular models from AD programs are highly variable with specific content influenced by the institutions mission (Galvin, 2005). CoARC requires that entry-level respiratory therapy programs (associate or baccalaureate) curriculum include, at minimum, course content in the following areas: oral and written communication skills, social/behavioral sciences, human anatomy and physiology, cardiopulmonary anatomy and physiology, cardiopulmonary pathophysiology, chemistry, physics, microbiology, and pharmacology (CoARC, 2010). CoARC also requires that respiratory therapy programs must include content in the following areas:

health promotion, patient education, disease management, health care reimbursement, research, medical ethics, provision of services and management of patient with transmissible diseases and or/special needs, community health, medical emergencies and legal and ethical aspects of respiratory therapy practice (p. 24).

Graduates from all entry-level programs must also be “competent in interpersonal and communication skills to effectively interact with diverse population groups” (p. 24) “as well as competent in the application of problem solving strategies in the patient care setting” (p.25).

Currently, the total number of credits offered in associate degree in respiratory therapy range from 72 to 90 credits, expanding many programs to almost three years of college level work (Marshall, 2012). As medical science advances, it will become

increasing difficult for associate degree programs to add material to their curriculums. The challenge facing associate degree education programs is the ability to continue to meet the needs of an expanding scope of practice and to provide strong critical thinking and communication.

Respiratory Therapy Baccalaureate Degree Curriculum

Although the associate degree is the most common career pathway for entry into the respiratory therapy profession, the baccalaureate degree has been an academic option for almost 40 years (Douce, 2005). The U.S. Department of Education defines a bachelor's degree as an award (baccalaureate or equivalent degree) that normally requires at least four but not more than five years of full-time equivalent college-level work (IPEDS, 2014).

The two-year pre-professional plus two-year professional curriculum is the most common design for earning a baccalaureate degree in respiratory therapy. The total number of credits offered in baccalaureate degree programs range from 120-150 hours of college level work (Douce, 2005). A typical bachelor's degree in respiratory therapy includes a general education core curriculum consisting of courses in biology, human anatomy and physiology, microbiology, physics, chemistry, math, psychology, philosophy and ethics as well as courses in written and oral communication. The professional phase of baccalaureate degree programs includes upper-division respiratory therapy courses with an emphasis on leadership, patient care planning, evidence-based medicine and research.

Baccalaureate degree respiratory therapy programs prepare graduates with the ability to assess and quantify the patient's cardiopulmonary status, to provide appropriate

therapy by independently applying patient care protocols, to evaluate the medical necessity and cost effectiveness of patient care and to understand the fundamentals of research (Barnes, Kacmarek, Kageeler, et al. 2011). The expectation is that in the near future, in addition to their active role as a bedside practitioner, all respiratory therapists will be considered the experts in the field and will act as consultants on the provision of respiratory care (Beachey, 2012). Therefore, the education needed by the workforce to assume these new responsibilities should be at the baccalaureate or graduate degree levels (Barnes, Kacmarek, Kageeler, et al. 2011).

Baccalaureate Degree Completion Programs

One of the challenges that respiratory therapists face is that others do not view respiratory therapy as a true profession. Although there is no widely accepted definition of a profession, the usage of the term represents more than prestige or status. Mishoe (1997, p. 72) defines a profession as:

a calling or vocation requiring, specialized knowledge, methods, and skills, as well as preparation in an institution of higher education, in the scholarly, scientific, and historical principles underlying such methods and skills.

According to this definition, respiratory therapy is a profession; however, the entry-level status of associate degree does not meet the accepted Centers for Medicare and Medicaid Services education standard for a profession (Becker, 2003a). In order to achieve recognition as a profession, the majority of respiratory therapists must hold a baccalaureate degree. As almost 90% of respiratory therapy programs provide associate degrees, doing so may be a daunting task. Therefore, in 2003, the American Association for Respiratory Care released a landmark white paper in support of advanced education

and credentialing for respiratory therapists. Specifically the paper identified the need for an increase in the number of respiratory therapists with advanced training and education to meet the demands of providing services requiring complex cognitive abilities and patient management skills (AARC, 2003). The letter goes on to state that increasing the number of RTs with advanced education and credentials is essential for profession to continue to grow and prosper. At this time, the AARC agreed to facilitate the development of articulation and bridge agreements between community colleges and four-year colleges. According to the 2014 AARC Human Resource Survey, only 25% of respiratory therapy education programs are located in four-year institutions, however, 63% reported that they could provide a baccalaureate degree to students wanting to earn one (AARC, 2014c). Currently there are 33 AD to BD completion programs in the United States offering a degree advancement track for those therapists wishing to continue their education and earn a baccalaureate degree (CoBGRTE, 2015).

Academic and Professional Degrees

An important distinction to make among types of degrees is whether they are academic or professional. According to the U.S. Department of Education, the baccalaureate, Master's and Doctor of Philosophy degrees are considered academic degrees (IPEDS, 2014). In contrast, first professional degrees are awarded to those who have completed the requirements for an academic degree (usually a BD) plus the length of the professional program itself (IPEDS, 2014). First professional degrees are typically awarded in fields such as Dentistry (D.D.S.), Medicine (M.D., D.O.), Optometry (O.D.) and Law (L.L.B., J.D).

A more recent trend has been the development of first professional degrees known as the clinical doctorate, clinical practice doctorate, or professional doctorate degree (American Association of Colleges of Nursing [AACN], 2004). These degrees typically require three to four years of education beyond the baccalaureate degree and blend didactic instruction with supervised clinical instruction. Over the last 20 years, a majority of allied health professions, such as physical therapy, occupational therapy, physician assistants, and audiologists, have reacted to the changes in the health care environment by discontinuing baccalaureate entry-level preparation in favor of a Master's or clinical doctorate degrees (CoBGRTE, 2014).

Many professions can trace their roots to a technical beginning. The professions of physical therapy and physician assistant also began as certificate programs; however, as the professions evolved many moved directly to the university setting and offered a baccalaureate degree for entry-level educational requirements prior to moving to the master's and doctoral degree (CoBGRTE, 2014). On the other hand, occupational therapy and audiology educational programs were established at the baccalaureate degree level and since have moved to the master's and doctorate degree. The rationale for moving to the first professional degree included the increasing depth and breadth of practice skills, the need to apply theory to practice, and the need for direct patient access without a physician referral (Plack & Wong, 2002). As these programs began offering academic degrees in the university setting, the movement toward clinical master's and doctoral degrees has progressed more rapidly than in professions such as respiratory therapy and nursing, which commenced in technical and community colleges.

Nursing Education

Similar to respiratory therapy, the nursing profession has entry at both the associate and baccalaureate degree levels (Barnes, Kacmarek, Kageler, et al. 2011). Although the initial movement of nursing education toward the bachelor's of science in nursing (BSN) degree began in 1917 and the American Nurses Association position paper called for baccalaureate to be the entry-level degree for nursing in 1965, nursing shortages resulted in the proliferation of associate degree nursing programs (National League for Nursing [NLN], 2011). Consequently, 50 years later, entry into the profession remains at the associate degree level and ironically, the nursing shortage still exists.

The basic educational preparation of AD and BD nurses has many differences. A major indicator of these differences is the coursework required for the AD graduate to complete the BD degree in nursing. Most BD completion nursing programs require additional courses in ethics and humanities as well as courses in the advanced sciences. BD nursing education emphasizes critical thinking, health education, leadership and professionalism (Meyer, 1997).

Nonetheless, the effect that associate degree nursing programs have on the nursing practice is significant as they produce almost 60% of the nursing workforce (NLN, 2011). Similar to the respiratory therapy profession, all nurses regardless of preparation are able to take the same licensure examinations and work alongside their more educated counterparts often with no distinction in pay, benefits or career advancement (Nelson, 2002). Donley and Flaherty (2002) state that under-educated members of the health care team rarely participate as members of state and national

governing boards; consequently a majority of practicing nurses have little opportunity to engage in clinical or health care policy. Therefore, many associate degree nurses are left behind while other health care practitioners influence the advancement of their professions.

Research has shown that the major advantage of AD nursing programs is that they are accessible, have low tuition costs, offer part-time and evening study opportunities and shorter lengths of programs (Meyer, 1997). Although BD nursing programs are longer in length and have higher tuition costs, they provide advantages as well. A search of the nursing literature based on education level and job satisfaction reported greater job satisfaction from nurses with baccalaureate and graduate degrees. A systematic random sample of 55,151 registered nurses in the US (62% response rate) found that 87.3% of registered nurses (RNs) with graduate degrees were satisfied with their job, whereas 81.3% of baccalaureate degree RNs and 78.6% of associate degree RNs reported satisfaction with their jobs (Health Resources and Services Administration [HRSA], 2010).

Research has also shown that nurses with BD have greater opportunities for advancement into leadership positions, and into graduate programs that provide the pathway for autonomous practice (Meyer, 1997). Nurses with baccalaureate or graduate degrees often work in the areas of management, education, and anesthesia or as physician extenders, therefore work more autonomously and typically earn higher salaries (CoBGRTE, 2014). Therefore it is likely that job satisfaction is related to autonomy and salary. These findings are consistent with the trends in higher education which has shown that individuals with baccalaureate or graduate degrees are more likely to be satisfied

with their jobs, report higher earnings and claim their work gives them a sense of accomplishment (Baum, Kurose, & Ma, 2013).

Research also supports the ideology that baccalaureate and graduate prepared health professionals are more proficient in affective skills such as professionalism, critical thinking, and effective communication (Belgen, Vaughn, & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994). These findings suggest that increasing the entry-level education requirements to a baccalaureate degree in respiratory therapy may produce similar results.

Although the associate degree continues to be the minimum entry-level educational requirement for the nursing profession, the nursing model for practice uses a clinical ladder based on education, requiring advanced degrees for those practicing in critical care areas. In addition to baccalaureate degree nurses, there are advanced-practice nursing (APN) programs in the areas of management, education, anesthesia and physician extender; these programs are offered at the master's level. The certified nurse practitioner (CNP) may become certified in several areas and provide a full scope of practice with the ability to diagnose and treat with prescriptive privileges (CoBGRTE, 2014). The American College of Nursing has recommended that the Doctor of Science in Nursing (DSN), similar to the Doctor of Nursing Practice (DNP), be the standard of academic preparation for all advanced practice certifications by 2015. The Doctor of Philosophy (PhD) in nursing degree is also available for the purposes of supplying academic faculty. Table 1 compares the typical entry-level didactic and clinical training requirements for several health care professions.

Table 1

Comparison of Entry-level Didactic and Clinical Training for Health Care Professions

Profession	Entry-level Credential	Years of college required	Duration of program (years)	Total years required for entry
Occupational Therapists	MS or OTD* *Required 2025	4	2.5	6-7
Physical Therapists	MS or DPT* *Required 2015	4	2-3	6-7
Physician Assistants	PA – BS or MS *MS required by 2020	2	1-2	3-4
Audiologists	AuD	4	3-4	7-8
Registered Nurses	RN – AS or BS	0-4	1-2	2-4
Respiratory Therapists	CRT or RRT* AS, BS, MS	0-2	1-2	2-5

Note. MS = Master of Science, OTD = Doctor of Occupational Therapy, DPT = Doctor of Physical therapy, PA = Physician Assistant, AuD = Doctor of Audiology, RN = Registered Nurse, AS = Associate of Science, BS = Bachelor of Science, CRT = Certified Respiratory Therapist, RRT = Registered Respiratory Therapist.
*preferred credential

In summary, research has shown that nurses and other health care practitioners with baccalaureate and graduate degrees bring unique skills to their work that plays an important role in the delivery of safe patient care (Aiken, Clarke, Cheung, Sloane, & Silber, 2003). Similarly, strong evidence supports the need for respiratory therapists to adopt expanded roles, work more independently in settings across the continuum of care, and collaborate as partners in the healthcare delivery team (Kacmarek, et al, 2009; Barnes, Gale, Kacmarek, & Kageler, 2010; Barnes, Kacmarek, Kageeler, et al. 2011). In the spring of 2009, the second of three conferences was held with the focus of identifying specific competencies graduate and practicing RTs will need in 2015 and beyond

(Barnes, Gale, Kacmarek, & Kagler, 2010). Identification of competencies needed by the respiratory therapy workforce to assume the new responsibilities that continue to emerge as the healthcare system changes is an important step for determining the education needed to assure graduates are prepared to enter the workforce. The second conference identified 73 competencies in seven major areas: diagnostics, disease management, evidence-based medicine and respiratory therapy protocols, patient assessment, leadership, emergency and critical care and therapeutics. A major finding from the second conference was that graduates of respiratory therapy programs need to enter the profession as the “expert on respiratory care and be ready to consult on the provision of respiratory care” (Barnes, Gale, Kacmarek, & Kagler, 2010, p. 608). Subsequently, abilities such as critical thinking and an in-depth knowledge of evidence-based medicine are required for respiratory therapists to advocate for the best approach to care for the specific needs of an individual patient.

Program Outcomes

To become a member of most health professions, one must acquire a specific set of knowledge and skills to be considered competent to function effectively in the health care environment. Competency implies more than just technical skills; it is the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, and values for the benefit of the clinician and the community he or she serves (Gruppen, Mangrulkar, & Kolars, 2010). Competency is expressed in terms of measurable behavior and often carries with it a broader more conceptual indication of what the learner is able to do as a result of education (Gruppen et al., 2010). The context in which healthcare is provided has evolved from a patient and healthcare provider relationship to a

collaborative relationship between the patient and an inter-professional team of healthcare providers. This team approach to patient care is influenced by the patient, the family, the community, and third-party payers (e.g., Medicare, Medicaid, insurance providers). Therefore, rote memorization and technical proficiency will no longer be adequate for the education of healthcare providers. Rather, a practiced approach to critical thinking, information gathering, and decision making tailored to the trends and needs of the expanding complex healthcare environment is needed to develop competent practitioners. Miller (1990) developed a Learning Pyramid that provides the foundation for the assessment of competence. His model consists of four levels of learning that describe whether a learner can demonstrate his or her knowledge, competence, performance, and action (see figure 2).

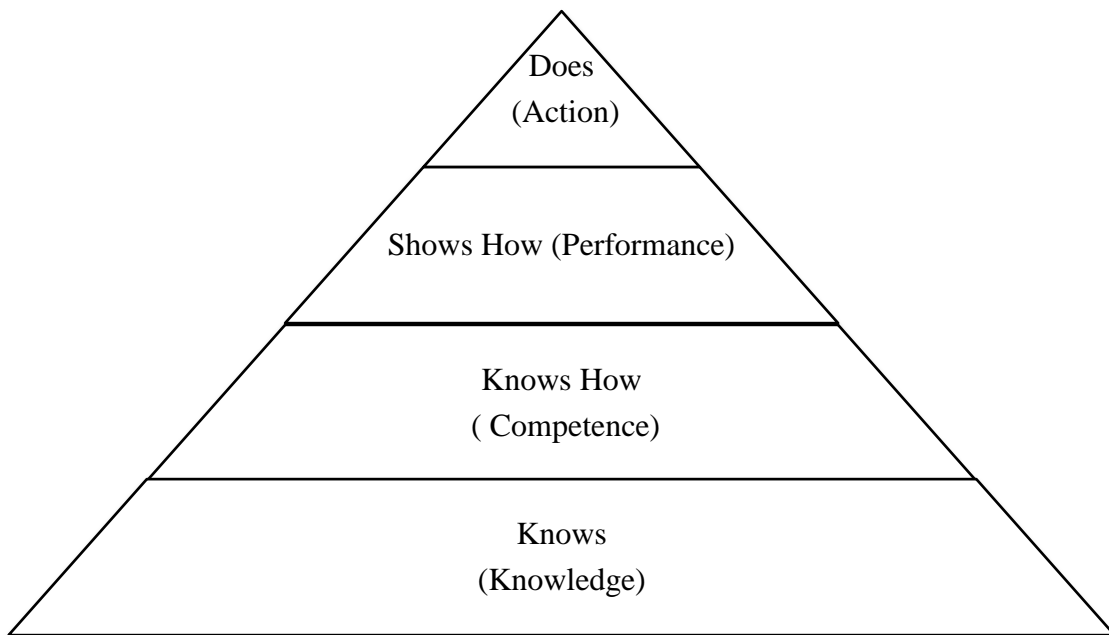


Figure 2. Framework for Clinical Assessment. Adapted from “The Assessment of Clinical Skills/ Competence/Performance, by Miller, G.E., 1990, Academic Medicine, 65(9), p. s64. Retrieved from: <http://winbev.pbworks.com/f/Assessment.pdf>

The base of the pyramid represents what the student “knows” focusing on recall of facts and progresses through a hierarchy to “knows how,” “shows how,” and “does” (Miller, 1990). Knowledge is largely measured through objective testing methods such as board examinations. Although tests of knowledge are important they are incomplete tools for the assessment of competence. Therefore the second level of the pyramid represents evidence that the student “knows how” to use the knowledge they have accumulated to learn how to solve problems and perform skills acquired during the education process. These competencies are learned and practiced in the laboratory setting. Once minimum competency has been achieved in the laboratory setting, students are then required to demonstrate their knowledge and competence by showing they know how to perform the competencies required for graduation. Performance is much more difficult to assess and is typically based on direct observation of the student by a clinical instructor in a controlled setting using patients, simulations, and/or case-based learning. The final level of the pyramid represents evidence that the graduate is adequately prepared to enter the workforce and is competent to practice independently in patient care setting. The action component of the pyramid is the most difficult component of competence and professional behavior to measure accurately and reliably (Miller, 1990), however, may provide the best measure of competence. As students’ progress through each level of the learning pyramid, they should be required to continually demonstrate higher levels of cognitive ability such as critical thinking, problem solving, and decision making.

Critical Thinking, Assessment & Problem Solving

According to Glaser (1941) the ability to critically think involves the willingness to consider, in a thoughtful way, the problems and subjects that come within the range of one's experiences; knowledge of the methods of logical inquiry and reasoning; and skill in applying those methods. Thus, critical thinking is a self-guided, self-disciplined way of thinking, which attempts to improve one's quality of thinking by skillfully analyzing, and reconstructing one's thinking in order to develop well-reasoned conclusions and solutions (Glaser, 1941). The ability to identify the source of patient problems and to resolve those problems with the best available treatment is essential for patient care (Shelledy & Stoller, 2002).

Clinical reasoning involves the cognitive processes of critical thinking and reflective problem solving (Facione & Facione, 2008). According to Facione and Facione (2008), critical thinking can be defined as “the process of purposeful, self-regulatory judgment” with the goal of deciding “ what to believe and/or what to do in a given context, in relation to the available evidence, using appropriate conceptualizations and methods, and evaluated by the appropriate criteria” (pp. 1-2). Through the lens of health care, this definition of critical thinking means that:

for clinicians to arrive at a judgment about what to believe and what to do, a clinician should consider the unique character of the symptoms [evidence] in view of the patient's current health and life circumstances [context], using the knowledge and skills acquired over the course of their training and practice [methods, conceptualizations], anticipate the likely effects of a chosen treatment action [consideration of evidence and criteria], and finally monitor the eventual

consequences of delivered care [evidence and criteria] (Facione & Facione, 2008, p.2).

Research on critical thinking in nursing education has shown that when students do not think reflectively about clinical situations, they tend to use other methods for resolving problems such as asking someone else, doing nothing, or to keep doing what they are doing even though it is not working (Facione & Facione, 1996, 1997). Thinking that uses intellectual skills alone without essential intellectual traits may result in clever but careless thinking that may have unintended consequences in the patient care setting.

While some of the patient problems that healthcare practitioners deal with in everyday practice may be simple and straightforward, others problems may be more complex and may have complicated solutions, if they have a solution at all. These more challenging problems require the practitioner to test ideas and theories in order to arrive at a solution (Rolfe, 2014). Hence, practice in the patient care setting allows students to apply the theoretical knowledge they learned in the classroom to real-life problems. Doing so gives them the opportunity not only to observe other healthcare professionals utilize knowledge from many sources to resolve identified problems, but also to evaluate their own critical thinking and problem-solving abilities (Sullivan, 2012).

CoARC Curriculum Guidelines

Assessment is a critical component of any curricular model. It is the responsibility of the education program to demonstrate that competence has been achieved and the responsibility of accrediting agencies to determine the extent to which education program meet the expected standards of quality. The Commission on Accreditation for Respiratory Care (CoARC) is the accrediting agency for respiratory therapy education programs in

the United States. According to CoARC (2013), an entry-level program is defined as an education program designed to provide students who possess no prior competence in respiratory care with the knowledge and clinical skills required to function as a registry-eligible respiratory therapist. CoARC judges the quality of an educational program by its ability to prepare graduates with the competencies identified by the National Board for Respiratory Care (NBRC) credentialing examinations and the competencies described by accreditation agency standards (CoARC, 2014). Therefore the CoARC assessment philosophy is more outcome/competency based than process based.

Furthermore, graduation from a respiratory therapy program does not guarantee licensure attainment, which is required to practice in the field. The respiratory therapy profession is unique and requires the passage of two additional examinations to attain the Registered Respiratory Therapist (RRT) credential – the highest credential awarded by the NBRC. In order to achieve the RRT credential, a student must first obtain the Certified Respiratory Therapist (CRT) credential, which is required for licensure, and then must pass an additional two-part examination, the Written Registered Respiratory Therapist examination (WRRT) and the Clinical Simulation Examination (CSE).

Two recent studies exploring the relationship between graduates of associate and baccalaureate degree-granting respiratory therapy educational programs were undertaken to see if there was a difference in performance on NBRC credentialing exams. Shaw and Traynor (2010) identified a small but statistically significant increase in CRT, WRRT, and CSE examination pass rate percentages in candidates who graduated from baccalaureate degree programs compared to candidates from associate degree programs. Meyers- Moss (2013) found that NBRC examination candidates who graduated from

baccalaureate degree programs achieved small but statistically significantly higher WRRT examination z-scores (.08 z-score units) than candidates graduating from associated degree programs. It is important to note that although baccalaureate prepared graduates did pass NBRC credentialing examinations at significantly higher rates, the effect size was small. Therefore, factors other than academic degree may have a greater influence on pass rates of credentialing examinations.

However, performance on credentialing examinations is not the rationale for moving to the baccalaureate degree as the minimum entry-level respiratory therapy education requirement. The continued growth and advancement of the profession, and the expectations placed on respiratory therapists (RTs) will require that every RT demonstrate an advanced level of critical thinking, assessment and problem solving skills (Barnes et al., 2010). Therefore the rationale for advancing to the baccalaureate entry level is to better prepare students to function at this advanced level.

Research has shown that these advanced skills are not assessed by the NBRC credentialing examinations. Although some educators believe that the clinical simulation examinations assesses critical thinking skills, studies have failed to show significant correlations between CSE scores and critical thinking as measured by the Watson-Glaser Critical Thinking appraisal (Hill, 2002; Mishoe, Dennison, & Goodfellow, 1997; Shelledy, Valley, Murphy, & Carpenter, 1997). Therefore it is important to look at outcome measurements that more accurately represent a programs ability to prepare students for entry-level practice, such as graduate and employer satisfaction surveys.

"Assessment is not an end in itself but a vehicle for educational improvement."
(Maki, 2010, p.40). Measurement of student outcomes provides feedback about how well

educational programs, and the university as a whole are accomplishing their stated missions and goals. The rationale for having better programs is to ensure better student outcomes. In order to assess competence, one needs to be able to evaluate the cognitive, psychomotor and affective skills in the actual practice setting. Entry-level respiratory therapy programs have long used graduate and employer surveys to assess the programs ability to prepare its graduates for entry into the profession and graduate competence in the patient care setting. Therefore, it is reasonable to assume that examining outcome measures specifically designed to assess a respiratory therapy educational program's ability to prepare its graduates with the competencies required for practice along with assessing performance on credentialing examinations may be more effective in assessing the multidimensional concept of competence.

Using the systems approach framework as a lens through which to understand and measure the outcomes of a respiratory therapy education, graduates can see that returns on their investment in their education extend beyond job placement and compensation and include other results of the college experience, such as personal and professional development and application of learning for the benefit of others. Using this information, employers can knowledgeably judge whether or not colleges and universities are properly preparing qualified candidates.

Need for a More Educated RT Workforce

Government agencies, legislators, and third party payers all recognize the baccalaureate degree as the minimum education level that differentiates professions from technical groups (Barnes et al., 2010). This poses a major challenge for the profession as most respiratory therapists are trained at the associate degree level, therefore, services

outside the hospital setting are not reimbursed under current Medicare and Medicaid guidelines. While respiratory therapists do provide care outside the hospital setting, their services are not reimbursed by Medicare, which may have a tremendous impact on patient care and associated health-care costs. A recent push stemming from the 2010 Patient Protection and Affordable Care Act is to provide patient care in lower-cost environments such as the home (Barnes et al., 2010). As changes in health care policy, regulation, and reimbursement require respiratory therapists to adopt expanded roles, work more independently in settings across the continuum of care, and collaborate as partners in the healthcare delivery team, the profession is challenged with finding methods to meet the needs of their patients without causing workforce shortages.

In 2007, a task force to identify potential new roles and responsibilities that will be needed in the future was formed. Members of the task force were selected by the AARC Executive Director and represented various stakeholders in the profession such as employers, employee groups, professional associations, state and federal government agencies, education institutions, health-care delivery systems, and the public. Three separate conferences were held between 2008 and 2010.

The objective of the first conference held in 2008, was to identify and define potential new roles and responsibilities of respiratory therapists in 2015 and beyond (Barnes et al., 2010). The goal of the second conference was to identify specific competencies needed to assure safe and effective implementation of the roles and responsibilities of future respiratory therapists. Future specialty practice areas and specific competencies in the areas of diagnostics, chronic and acute disease management, protocols and evidence-based medicine, patient assessment, leadership, emergency care,

critical care and therapeutics were identified at the second task force conference (Barnes et al., 2010). The third and final task force held in 2010 was charged with developing plans to change the professional education process in order to achieve the competencies identified at the second conference (Barnes, Kacmarek, & Kageeler et al., 2011).

After review and discussion of the outcomes of the first two conferences, the recommendation was passed by an overwhelming vote that to be successful in the future the baccalaureate degree must be the minimum entry-level education requirement for respiratory therapy practice. Although conference participants overwhelmingly supported this recommendation, there are still many individuals who are unconvinced that the baccalaureate degree is necessary (Barnes, Kacmarek, & Kageeler, 2011). This skepticism mirrors controversy that has occurred in other disciplines contemplating increasing entry-level education requirements.

The main disagreement among professionals regarding increasing the degree requirements for entry into a profession is the reasoning or motivation for moving to the advanced degree (Plack & Wong, 2002). Supporters feel advanced degrees are necessary due to the increased professional non-technical competencies required to work in today's complex health care environment and to help students develop professional dispositions (Beachey, 2012). Others argue that advanced degrees will enable certain professionals to become physician extenders, faculty members, researchers and leaders in the profession (Shelledy & Wiezalis, 2005). Advocates also defend moving toward increasing entry-level education requirements stating that the time needed to master the additional competencies required of the profession justify the advanced degree (Barnes, Kacmarek, & Durbin, 2011). Proponents for the increase in entry-level education requirements argue

that the increased knowledge, skills, and professional attributes required of the profession simply cannot be taught in the confines of an associate degree program (Barnes, Kacmarek, & Kageeler et al., 2011).

Degree Creep

Degree creep – requiring a higher degree than needed to perform a job has become an increasing concern for many allied health professions (Plack & Wong, 2002). The uneasiness about degree creep stems from the assumption that there is a lack data supporting the increased educational requirements (Plack & Wong, 2002). Therefore those opposed to advancing to the baccalaureate degree prefer the career ladder design where additional education and training occur after graduation from an entry-level program and while working to help pay for the additional schooling (Dulle, 2012). Those opposing increased academic degree requirements for entry into the profession of respiratory therapy argue that advancing to the baccalaureate degree could potentially reduce the number of new graduates at a time when health-care workers are increasingly in short supply (Dulle, 2012).

Others contend that increasing degree requirements may increase healthcare costs, as more highly educated individuals would expect a wage premium (Dulle, 2012). However, historically it has been labor market factors, such as supply and demand, not degree that has driven wages in the profession. As associate and baccalaureate degree prepared therapists currently perform the same duties and receive the same wage, increasing the degree requirements will most likely have a minimal effect on healthcare costs (Barnes, Kacmarek, & Kageeler et al.; Becker & Nguyen, 2014).

In December of 2010, the National Network for Associate Degree Respiratory Care (NN2RC) was founded in response to the “2015 and Beyond” conference. The NN2RC is committed to actively promoting the associate degree as entry into the field of respiratory therapy practice. The network threatened to become an accrediting organization for two-year programs if CoARC decides to stop accrediting associate degree programs (Ashford, 2011). As 85% of respiratory therapy programs are located in two-year institutions, the AARC decided to put the baccalaureate degree entry-level education recommendation on hold until CoARC data indicates an adequate number of future baccalaureate degree graduates are available to satisfy future workforce demands (AARC, 2014). Although program directors from community colleges oppose the baccalaureate degree entry-level requirement for respiratory therapy education, they do recognize the need for advanced degrees in the profession while maintaining the associate degree as the standard entry into the field (National Network for Associate Degree Respiratory Care [NN2RC], 2015).

A survey of respiratory therapy education program directors found that a majority (87.0%) of BD program directors believed that a baccalaureate or master’s degree should be the minimum education level required for entry into practice. A high proportion (81.3%) of AD program directors believed that the associate degree should remain the requirement for entry into the profession. However, a majority of both BD (100%) and AD (65.8%) program directors believed that a baccalaureate or master’s degree should be required for future graduates after they have begun practice (Barnes, Kacmarek, & Durbin, 2011).

Faculty Shortages

Another reason for opposing the baccalaureate degree as the minimum educational requirement for entry into the profession is the lack of respiratory therapy faculty available to teach at the advanced degree. Currently there are only six master's level programs accredited by the CoARC and a very low number of RTs with graduate degrees (CoARC, 2013). Additionally, it was estimated that 47.5% of program directors and 34.2% of directors of clinical education plan to retire from accredited respiratory therapy programs by the year 2015 (Barnes, Kacmarek, Kageeler, et al. 2011). The loss of key program faculty at the same time the entry-level education requirements are increasing is a cause of serious concern.

On the other hand, there has been a recent push to create additional programs in order to address the faculty shortage issue (CoBGRTE, 2015). A recent survey of 52 baccalaureate degree respiratory therapy programs indicated that 22 plan to start a master's degree program for RTs in the near future (Barnes, Kacmarek, & Durbin, 2011). Increasing the education requirements of the profession will not only increase the number of baccalaureate degree prepared therapists but also increase the number of therapists available to further their education and potentially move into faculty positions.

Societal Needs

The most compelling line of reasoning for advancing to the baccalaureate degree entry-level is the need to address the critical societal need for a more educated respiratory therapy workforce. In order to transport respiratory care into the future, the focus must be on safety, quality, and affordability. Recently chronic obstructive pulmonary disease (COPD) has become the third leading cause of death in the United States (CDC, 2014).

Likewise, more patients may be diagnosed with chronic and acute respiratory illness due to the aging population of the United States. Therefore disease prevention and health promotion rather than illness treatment has become the gold standard.

Summary

Wherever they practice, respiratory therapists are expected to participate in the development, modification, and evaluation of patient care plans, disease management and patient education. The continued growth and advancement of the profession and the expectations placed on respiratory therapists (RTs) will require that every RT demonstrate an advanced level of critical thinking, assessment, and problem solving skills (Barnes, Kacmarek, & Kageeler et al., 2011). These skills are essential in today's health care environment not only to improve the quality of care, but also to reduce inappropriate care and control costs (Barnes, Kacmarek, & Kageeler et al., 2011).

The major barrier to raising the entry-level education to the baccalaureate degree is that most of the respiratory therapy education programs in the United States are located in community and technical colleges (Barnes et al., 2010). However, failure to require additional levels of education in today's healthcare environment suggests that respiratory therapy is more of a technical than a professional career. Advancing the educational standards may enhance the profession and possibly raise the stature of the respiratory therapist. It may also improve safety and quality of patient care.

Becker (2003b) surveyed 365 respiratory therapy department managers (26% response rate) and found that 70.4% of department managers preferred hiring experienced RTs who have obtained or are working toward a baccalaureate degree. Another survey of 663 (28% response rate) RT department managers was undertaken to determine

department director's preferences for educational preparation of new graduates. Results of the survey revealed that a majority (70.1%) of RT department directors were in favor of their staff earning a baccalaureate or graduate degree in order to advance in the profession. (Kacmarek, Barnes, & Durbin, 2012). However, there was no consensus among directors on the academic preparation of new graduates, with 36.8% indicating a preference for a baccalaureate or master's degree, 36.7% indicating a preference for an associate degree, and 26.5% indicating no preference. There was no clear rationale for this finding. However, 54.2% (n=221) of directors from large (>345 bed) hospitals indicated a preference for BD for preparation of new graduates, whereas 31.6% of directors from small hospitals indicated a preference for the AD for graduate preparation. As large hospitals have more intensive care unit beds, busy emergency departments and perform more advanced diagnostic procedures, RTs are required to work with the multidisciplinary team that assesses and treats patients with lung disease and respiratory insufficiency, necessitating staff with advanced education and skills (Kacmarek, Barnes, & Durbin, 2012). The study also found that the average orientation time for new employees ranged from 0 to 52 weeks, with a median orientation time of 4.0 weeks for baccalaureate and 6.0 weeks for associate degree graduates.

A growing body of research has shown that hospital's employing a higher percentage of baccalaureate prepared nurses was linked to better patient outcomes (Aiken et al., 2003; Kendall-Gallagher, Aiken, Sloane, & Cimiotti, 2011; McHugh et al., 2013; Tourgeau et al., 2007). Recent studies have supported the association between baccalaureate degree nursing staff and outcomes such as providing: (1) safer practice environments, (2) lower rates of mortality and hospital-acquired infections and (3)

decreased failure to rescue rates (Aiken et al., 2003; Kendall-Gallagher, Aiken, Sloane, & Cimiotti, 2011; McHugh et al., 2013; Tourgeau et al., 2007).

Research has also shown greater job satisfaction from nurses with baccalaureate and graduate degrees (HRSA, 2010; Meyer, 1997). Additionally, research from other health care disciplines suggests that graduates with advanced degrees are more likely to demonstrate professional behaviors, critical thinking skills, and effective communication skills (Belgen et al., 2001; Johnson, 1988; Warren & Pierson, 1994). The 2010 Patient Protection and Affordable Care Act (PPACA) was created to provide incentives for health care providers that offer the preventative, primary care and care coordination services (Kaiser Family Foundation, 2013). Providing such services is important for improving patient outcomes and reducing the number and length of hospital stays with the ultimate goal of decreasing health care costs (Kaiser Family Foundation, 2013). Therefore it seems reasonable that hospitals and other health care facilities would prefer to employ practitioners with excellent critical thinking and problem solving skills in order to provide high quality patient care while reducing health care costs.

Since the ultimate goal of respiratory therapy education is to enable students with the cognitive, psychomotor, and affective skills required to practice independently in the health care setting, patient care experiences should be employed as early and frequently as possible in the curriculum. It is during these experiences that students develop an appreciation for the challenge of providing appropriate care for various patient problems, for learning to detect changes in a patients' condition over time, and for learning how to communicate effectively with patients, their families, and the health care team to provide optimum patient care. The Association of American Medical Schools (AAMA, 2008)

recommends that medical education should focus on what the student can do as a result of learning rather than the content of process of instruction and suggest that medical schools adopt specific competency goals that determine measurable competency objectives for students during the curriculum. These competency objectives must describe the outcomes that students are required to demonstrate as a result of their education and should guide the design of the curriculum. The Miller (1990) pyramid provides a foundation for assessment that begins with what the learner *knows* and progresses through the levels of *Knowing how*, *showing how*, and *does*. Using objective testing methods such as board examinations largely assesses knowledge. However, board examinations are not the best measures for assessing competence. According to Krackov and Pohl (2011), the action or *does* level of Miller's (1990) Learning Pyramid needs to be assessed by observing the graduate in the real practice setting.

Although considerable research concerning academic degree has been completed in other disciplines, to date only two studies have been published in which National Board for Respiratory Care (NBRC) examination scores from associate and baccalaureate degree graduates were compared (Meyers-Moss, 2013; Shaw & Traynor, 2010). Currently there is no existing research comparing associate degree and baccalaureate degree respiratory therapy educational programs ability to prepare graduates with the competencies required for entry into the profession. Therefore, the purpose of this study was to compare associate degree and baccalaureate degree respiratory therapy educational programs ability to prepare graduates with the competencies required for entry into the profession. CoARC uses graduate and employer surveys to receive feedback from graduates' and their employers regarding the programs ability to prepare

graduates for entry into the profession. Graduate and employer surveys were designed to assess graduate competence in the real practice setting, therefore were used to assess the top level of Miller's (1990) pyramid – the *does* level as well as the graduates higher levels of cognitive abilities used in clinical reasoning and problem solving. The study compared associate and baccalaureate degree graduate and employer surveys to determine the extent to which alumni and their employers believe the programs curriculum prepares graduates to meet the requirements of the job.

Graduate and employer surveys are emailed to graduates and their employers six months to one year after graduation. This time frame provides graduates and employers with ample patient care experiences to judge the effectiveness of the graduate's preparation. Therefore, it is reasonable to speculate that if baccalaureate degree programs provide more appropriate education relative to job requirements than associate degree programs, the results of graduate and employer surveys would be different for the two groups. As such, the results of graduate and employer surveys may provide a means by which academic degree appropriateness can be evaluated in respiratory therapy education.

CHAPTER III

METHODOLOGY

Introduction

The primary goal of this study was to better understand the extent to which associate and baccalaureate degree entry-level respiratory therapy programs prepare graduates with the competencies required to practice upon entry into the profession, as perceived by graduates and employers. While there has been considerable research concerning academic degree level in other disciplines, there is a significant gap in the literature related specifically to the adequacy of respiratory therapy educational preparation. To address this gap, this study employed a quantitative research design to evaluate the relationship between the types of entry-level education (associate degree vs. baccalaureate degree) and selected program outcomes measures. Similarities and differences in the purpose of and course content required for the two program types were also assessed.

Purpose

The purpose of this study was to increase the understanding of the factors that contribute to or detract from the educational preparation of graduates between AD and BD entry-level respiratory therapy programs. This was examined with the use of graduate and employer survey ratings that are mandated by CoARC and collected annually by all accredited respiratory therapy programs for accreditation purposes. The following research questions were investigated in this study.

1. Is there a difference between associate degree and baccalaureate degree respiratory therapy education programs' ability to prepare graduates with the competencies required for entry into the profession in regard to:
 - a. Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC graduate surveys?
 - b. Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC employer surveys?
2. Is there a difference between graduate and employer perceptions of the educational program's ability to prepare its graduates with the cognitive skills, psychomotor skills, affective skills required for entry into the profession?
3. Is there a difference between associate degree and baccalaureate degree respiratory therapy programs' ability to prepare graduates with the competencies required for entry into the profession in terms of credentialing examination success as reported by the CoARC?
4. What are the differences between associate and baccalaureate degree programs with regards to mission, course content, and goals?

Participants

Graduate and employer surveys collected from 16 (15%) baccalaureate degree and 88 (85%) associate degree respiratory therapy programs that used the DataArc Education Service Provider to collect graduate and employer survey data were used for this study. DataArc is a biomedical education database service provider that supplies automated accreditation surveys. All respiratory therapy education programs have the option of purchasing the DataArc web-based application to provide automated reports for submission to CoARC. The complete sample consisted of 2315 graduate surveys and 1891 employer surveys. Table 2 summarizes degree type and demographic location for graduate and employer surveys.

Table 2

Graduate and Employer Survey Demographic Location (Percentages in Parentheses)

	N	Eastern	Central	Mountain	Pacific
Graduate Surveys					
AD	1993	781 (39.2)	654 (32.8)	180 (9.0)	378 (19.0)
BD	322	62 (19.3)	241 (74.8)	- -	19 (5.9)
Employer Surveys					
AD	1562	613 (39.2)	592 (37.9)	171 (11.0)	186 (11.9)
BD	329	49 (14.9)	258 (78.4)	- -	22 (6.7)

Note. AD = Associate Degree; BD = Baccalaureate Degree

Credentialing success data for graduates from all 418 accredited respiratory therapy programs were generated from an online data base posted annually on the CoARC website. All accredited respiratory therapy programs are required to submit an Annual Report of Current Status (RCS) to the CoARC for ongoing program review. The RCS data is self-reported by respiratory therapy programs to CoARC and reflects the

aggregate data from a three year time period (2011-2013). The study sample consisted of 361 associate degree programs and 57 baccalaureate degree programs.

Instruments

Graduate and Employer Surveys

CoARC mandates the use of standardized graduate and employer surveys for the annual review of all accredited respiratory therapy programs in the United States (CoARC, 2013). CoARC (2013) uses outcomes such as graduate and employer surveys to assess the perception of respondents as to the educational program's preparation of students in cognitive, psychomotor, and affective respiratory therapy competencies. The standardized graduate and employer surveys are self-report instruments in which the respondents are asked to rate the programs educational preparation of students in three domains: cognitive (knowledge), psychomotor (clinical skills), and affective (behavioral).

Graduate Surveys

The major purpose of graduate surveys was to receive feedback from graduates regarding the perceptions of their educational preparation for practice as respiratory therapists. Surveys were emailed to graduates six months to one year after graduation providing them with ample practice experiences to judge the preparation of the graduate.

The Graduate Survey consists of four sections (See Appendix A). The first three sections represent questions from the constructs of knowledge base, clinical proficiency, and affective skills rated on a five-point (1 = strongly disagree to 5 = strongly agree) Likert scale. Five questions measure the graduate's knowledge base (cognitive domain), four questions measure the graduate's clinical proficiency (psychomotor domain), and seven questions measure the graduate's behavioral skills (affective domain). The fourth

section of the graduate survey consists of a single five-point (1 = strongly disagree to 5 = strongly agree) Likert scale on which graduates rate the program's overall quality in preparing them to be respiratory therapists.

Employer Surveys

The major purpose for employer surveys was to provide an outside assessment of the graduates' performance as a respiratory therapist and to determine if employers believe that graduates possessed the knowledge and skills required to enter practice. Similar to the graduate survey, employer surveys were emailed to employers of graduates six months to one year after graduation providing them with ample time to evaluate the graduates' performance upon entry into the profession. Surveying employers longer than one year after graduation allows graduates additional training and experiences that may not reflect the educational programs ability to prepare their graduates for entry into the profession.

The Employer Survey contains four sections (see Appendix B). The first three sections represent questions from the constructs of knowledge base, clinical proficiency, and affective skills rated on a five-point (1 = strongly disagree to 5 = strongly agree) Likert scale. Five questions measure the graduate's knowledge base (cognitive domain), four questions measure the graduate's clinical proficiency (psychomotor domain), and nine questions measure the graduate's behavioral skills (affective domain). The fourth section consists of a single five-point (1 = strongly disagree to 5 = strongly agree) Likert scale on which employers rate the overall quality of the program's graduate.

Reliability of the Instrument

The current study utilized standardized surveys that have been used by CoARC since 1999 for the annual review of all accredited respiratory therapy programs in the United States. CoARC graduate and employer surveys were developed and evaluated by several experts in the field to order provide an opinion or rating on how well each question elicits a response that reflects the programs educational preparation of students in the cognitive, psychomotor, and affective domains (CoARC, 2014). To date, no published data regarding the internal consistency of the survey constructs currently exist.

Pilot Study

A pilot study involving two entry-level respiratory therapy education programs to test for reliability, validity, and correlation of the survey constructs was completed. The study consisted of 25 employer surveys, 16 from associate degree programs (64%) and 9 from baccalaureate degree programs (26%) and 25 graduate surveys, 14 from AD programs (56%) and 11 from BS programs (44%).

An acceptable value Cronbach's alpha was obtained from the pilot study ($> .80$) (Warner, 2013). Therefore the results from the pilot study suggest there is internal consistency of the employer and graduate survey constructs. This study was conducted under the assumption that employers and graduates were sincere and honest in their perceived ratings on satisfaction surveys. It was possible that ratings were subject to bias and may have been based on factors other than the competencies they were intended to measure. Table 3 represents correlations and measures of internal consistency from the pilot study.

Table 3

Correlation of Subscale Employer and Graduate Survey Constructs and Measures of Internal Consistency

Construct Number	Subscale Constructs	C1.	C2.	C3.	C4.	C5.	α
C1.	Knowledge (Employer Survey) (q1A,q1B,q1C,q1D,q1E)						.94
C2.	Proficiency (Employer Survey) (q2A,q2B,a2C.q2D)	.88*					.93
C3.	Behavior (Employer Survey) (q3A,q3B.q3C,q3D,q3E,q3F)	.70*	.78*				.92
C4.	Knowledge (Graduate Survey) (q1A,q1B,q1C,q1D,q1E)	.35	.32	.00			.96
C5.	Proficiency (Graduate Survey) (q2A,q2B,a2C.q2D)	.47*	.44*	.18	.87*		.94
C6.	Behavior (Graduate Survey) (q3A,q3B.q3C,q3D,q3E)	.50*	.36	.17	.84*	.88*	.89

*p < .05

Validity of the Instrument

Validity is the extent to which an instrument measures what is intended to measure. Construct validity is concerned with the extent to which a measure relates to other measures consistent with the concepts or constructs that are being measured (Carmines & Zeller, 1979). Graduate and employer surveys are used by CoARC to determine the extent to which graduates and their employers believe a programs curriculum prepares graduates with the competencies needed to enter the profession. According to Banta, Lund, Black and Oblander (1996) graduate and employer surveys are useful for assessing educational achievements from the perspectives of the employer

and the graduate. Therefore the results of graduate and employer surveys may provide a valid means by which academic degree appropriateness can be evaluated in respiratory therapy education.

National Credentialing Examinations

The National Board for Respiratory Care (NBRC) administers the respiratory therapy credentialing examinations. The Registry Examination System was developed to objectively measure essential knowledge, skills, and abilities required of advanced respiratory therapists, and to set uniform standards for measuring such knowledge (National Board for Respiratory Care [NBRC], 2015). The AARC recognizes the RRT credentialing examinations assuring that they are valid and reliable measures of competence within the limits of their respective examination matrices (AARC Position Statement, 2014). The National Organization for Competency Assurance's (NOCA) accrediting arm and the National Commission for Certifying Agencies (NCCA) accredits the credentialing examinations for RRT qualification (NBRC, 2015). To ensure continued validity of the credentialing examinations, the NBRC surveys practicing therapists, managers, and educators every five years as part of a detailed nation-wide task analysis (NBRC, 2015). All accredited respiratory therapy programs are required to submit RRT pass rates to the CoARC for ongoing program review.

The Registered Respiratory Therapist (RRT) credential is the highest credential awarded by the National Board for Respiratory Care. To earn the RRT credential, graduates must pass two computer-based examinations: (1) a 100-item multiple-choice examination, called the written registered respiratory therapist (WRRT) examination, plus (2) a branching logic clinical simulation examination (CSE). The NBRC maintains

that the RRT examinations measure advanced-level competencies beyond those that new graduates have at entry into the respiratory therapy workforce (NBRC, 2015).

Interestingly, graduates can apply for the RRT immediately after passing the licensure examination, potentially earning the RRT credential within four weeks of graduation.

A survey of directors of respiratory therapy departments regarding education requirements of RT students and staff was completed in response to the 2015 and beyond conferences (Kacmarek, Barnes, & Durbin, 2012). Of the 663 surveys returned (28% response rate), less than 38% of RT department directors indicated that they require RRT credential for employment, whereas 58% maintained that they gave their staff a time limit to achieve the RRT credential. Interestingly, of those departments that did not require the RRT, only 7.3% of respondents indicated that the work assignments were different for therapists with the CRT credential versus the RRT credential.

Data Collection

The University of North Dakota's internal review board approved the methodology for the study (IRB) in May 2015. The DataArc Service Provider agreed to work with the researcher for the purposes of this study and provided data from all 2013 graduate and employer surveys that were collected and stored from all programs using their service. All program, student, and employer identification was removed from the surveys to protect confidentiality. Therefore individual student, program, and employer demographic information was not available for analysis. Coding was used to match the program type with their respective employer and graduate survey responses. The survey results were compiled and entered into SPSS version 21.0 for analysis.

Credentialing success for graduates of all 438 accredited respiratory therapy programs was generated from the 2013 Annual Report of Current Status (RCS) posted on the CoARC website. Data was reported in aggregate form incorporating the three-year time period from 2011 to 2013. Data collected was grouped into associate degree or baccalaureate degree categories. The programmatic outcomes data were entered into SPSS for analysis.

Data Analysis

The independent variable in this study was type of entry-level education (associate degree vs. baccalaureate degree). The dependent variables were credential success, overall program satisfaction, and the constructs of knowledge base, clinical proficiency, and professional behavior obtained from both employer and graduate surveys. Measures for the constructs of knowledge base (cognitive domain), clinical proficiency (psychomotor domain) and professional behavior (affective domain) were taken from the CoARC graduate and employer survey instrument. All response items were examined on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A complete overview of the survey items are provided in Appendix A and B.

The score yielded by the Likert score ratings was a composite of the responses to the multiple items comprising the subscales to define the content and meaning of the construct being quantified. The cognitive construct for the graduate survey was assessed by averaging the mean Likert score ratings from questions I-A through I-E, the psychomotor construct for the graduate survey was assessed by averaging the mean Likert score ratings from questions II- A through II-D, and the graduate affective

construct was assessed by averaging the mean Likert score ratings from questions III-A through III-E. Similar to the graduate survey, the cognitive construct for the employer survey was assessed by averaging the mean Likert score ratings from questions I-A through I-D, the psychomotor construct for the employer survey was assessed by averaging the mean Likert score ratings from questions II-A through II-E, and the affective domain for the employer survey was assessed by averaging the mean Likert score ratings from questions III-A through III-F.

For the purposes of this study, graduate and employer survey Likert scale ratings were treated as interval data. Although the validity of using parametric statistics to analyze summative scale scores (those derived by averaging many Likert survey questions to measure an underlying construct) has been questioned, it has been argued that taking the average of several survey questions measured on five-point Likert scale would produce a “continuous measurement scale” meaning it can take on fractional values (Lewis-Beck, 1980; Sullivan & Artino, 2013). Even though the distances between rating scales are not exactly equal (in other words, the difference between 1.00 and 2.00 may not be the same as the difference between 3.00 and 4.00), if there is a difference, it is likely to be relatively insignificant (Lewis-Beck, 1980; Sullivan & Artino, 2013). Graphical inspection of the data indicated no departure from normality therefore the data represent a normal distribution. Normal distribution is one of the assumptions for parametric statistics as it is important that the means truly represent performance of the group (Rencher & Christensen, 2012; Warner, 2013).

The multivariate analysis of variance (MANOVA) test is an extension of the analysis of variance test and is used in situations where more than one outcome variable

is analyzed (Field, 2009) . MANOVA is designed to compare the mean differences between several dependent variables simultaneously, while controlling for the intercorrelations among them thereby reducing Type I error (Bray & Maxwell, 1985; Field, 2009; Warner, 2013). In other words, MANOVA incorporates information about several outcome measures and therefore provides information about whether groups of participants can be distinguished by a combination of scores on several dependent measures whereas ANOVA can only distinguish whether groups differ along a single dimension (Field, 2009).

Research Question 1

Comparison of AD and BD Graduate and Employer Surveys

Multivariate analysis of variance (MANOVA) tests were used to answer the first research question regarding the difference between associate and baccalaureate degree respiratory therapy education programs' ability to prepare graduates with the competencies required for entry into the profession. Mean Likert scale rating from the standardized graduate and employer surveys obtained from associate and baccalaureate degree programs on the combined constructs of knowledge base, clinical proficiency, and professional behaviors were analyzed. The level of significance (α) was set at 0.05 for the data analysis.

Univariate analysis of variance (ANOVA) and Least Significant Difference (LSD) post hoc tests were also performed to further investigate whether there was a difference between program type and each individual construct. Welch's F tests were used to compare the mean Likert scale ratings for the single survey item regarding the overall quality of the program (graduate survey) and quality of the graduate (employer

survey). Welch's F tests, a version of the F-ratio, are designed to be accurate when the assumption of homogeneity of variance has been violated (Field, 2009).

Research Question 2

Comparison of Graduate and Employer Surveys

Multivariate ANOVA and Welch's F tests were also performed to determine whether there were differences in the mean Likert scale ratings between graduate and employer surveys from AD and BD programs on the constructs of knowledge base, clinical proficiency, and professional behavior.

Research Question 3

Credentialing Success

To answer the third research question, a Mann-Whitney two-sample test was used to compare the percentage of graduates attaining the RRT credential one-year post graduation between associate degree and baccalaureate degree programs. Mann-Whitney is a non-parametric equivalent to the independent t-test (Field, 2009).

Research Question 4

Document Analysis

In order to present a more detailed description of the purpose of and course content required for the different program types, a document analysis was completed. Documents obtained from 22 associate and 22 baccalaureate degree institutions were analyzed. Maxwell (2013) suggests the use of purposeful sampling, or the deliberate selection of persons to provide information that is more relevant to qualitative research questions and goals than one could get from other sampling methods. Purposeful sampling was used for the selection of programs used for the document analysis. The programs selected were obtained from the Coalition for Baccalaureate and Graduate

Respiratory Therapy Education (CoBGRTE) and CoARC websites. Initially, documents from 31 programs offering a baccalaureate completion programs listed on the CoBGRTE site were reviewed, of those 31 programs seven were associate degree entry-level respiratory therapy programs that also offered a baccalaureate completion program, two were baccalaureate degree completion programs only (did not offer AD or BD entry level education), 20 were baccalaureate degree entry-level programs that also offered a BD completion program, and one program offered both AD and BD entry-level education as well as a BD completion program. As a majority of BD completion programs were offered at institutions that provided BD entry-level education, data were also obtained from a random sample of 12 AD entry-level programs for a total of 44 programs (22 AD and 22 BD).

Data such as institution and program mission, values, admission requirements, program length, course content and curriculum format were gathered from a total of 44 programs and studied to explore differences and similarities in the purpose of and course content required for associate and baccalaureate degree programs. A constant comparative method (Glaser & Strauss, 1967) guided the data analysis. Data were constantly checked and rechecked and compared to other pieces of data that were either similar or different. Inductive analysis allowed for critical examination of the data in order to draw new meaning from the data.

CHAPTER IV

RESULTS

This chapter includes findings from the data analysis of this study. Specifically, this chapter presents the results from two sets of data used to compare associate and baccalaureate degree respiratory therapy educational programs ability to prepare graduates with the competencies required for entry into the profession. Document analysis of associate degree and baccalaureate degree programs found on institutions websites were completed to present a more detailed description of the different mission, goals, learning outcome required by each program type. The researcher presents the results from multivariate and univariate one-way analyses of variance tests, Mann-Whitney U tests in addition to findings gained from the document analysis. The findings assess the study's conceptual model of respiratory therapy program effectiveness. This model builds on DeLapp's systems approach to respiratory therapy education and Mishoe's foundational framework of critical thinking in respiratory care as well as other literature on critical thinking (Benner et al., 2010; Dewey, 1933; Johnson, 2001; Jones, 1992; Ludwig, et al, 2010; Maring & Costello, 2009; Mohr, Ingram, Hayes, & Du, 2005; vonGlaserfeld, 1989).

Reliability and Validity of Instrument

The first set of data consisted of standardized graduate and employer surveys specifically designed to assess respondent's perceptions of the educational programs'

preparation of students in the cognitive, psychomotor, and affective domains. Table 4 shows the results for reliability and correlation tests for each construct.

Table 4

Correlation of Subscale Graduate and Employer Survey Constructs and Measures of Internal Consistency

Construct	Subscale Constructs	C1.	C2.	C3.	C4.	C5.	α
C1.	Cognitive Skills (Employer Survey) (QI-A, QI-B, QI-C, QI-D, QI-E)						.96
C2.	Psychomotor Skills (Employer Survey) (QII-A, QII-B, QII-C, QII-D, QII-E)	.90*					.95
C3.	Affective Skills (Employer Survey) (QIII-A, QIII-B, QIII-C, QIII-D, QIII-E, QIII-F)	.74*	.75*				.91
C4.	Cognitive Skills (Graduate Survey) (QI-A, QI-B, QI-C, QI-D, QI-E)	-.04	-.04	-.04			.96
C5.	Psychomotor Skills (Graduate Survey) (QII-A, QII-B, QII-C, QII-D)	-.01	-.00	-.01	.88*		.96
C6.	Affective Skills (Graduate Survey) (QIII-A, QIII-B, QIII-C, QIII-C, QIII-E)	.03	.00	-.01	.78*	.76*	.96

* $p < .05$, 2-tailed

The strongest construct correlations were between cognitive and psychomotor skills in the graduate and employer surveys (C1 and C2, C4 and C5). Moderate correlations existed between cognitive and affective skills (C1 and C3, C4 and C6) in both graduate and employer surveys as well as psychomotor and affective skills (C2 and C3, C5 and C6) in the graduate and employer survey results. Cronbach's alpha ratings

greater than .90 indicate acceptable reliability and validity for the graduate and employer survey instruments (Portney & Watkins, 2008).

ASSOCIATE VS. BACCALAUREATE DEGREE COMPARISONS

Research Question 1a. Graduate Survey Comparisons

The first analysis in this study examined whether there was a difference between the preparation of associate (AD) and baccalaureate degree (BD) prepared graduates in regards to the level two constructs of cognitive, psychomotor and affective skills assessed by the standardized graduate surveys. Type III sums of squares were used to correct for the unequal sample sizes, that is, the *SS* for each effect was calculated controlling for all other effects.

The Levene's test was significant for the constructs of cognitive and psychomotor skills ($p < .05$). The Levene's test determines if the variances in different groups are equal, a significant test indicates that the assumption of equal variance has been violated (Field, 2009; Warner, 2013). Research has shown that even large deviations of variance seldom have an effect on the interpretation of results (Mertler & Vannata, 2005; Warner, 2013). Therefore results from the MANOVA test were examined. Findings from the MANOVA tests were not significant, $F(3, 2311) = 2.27, p = .08; Wilk's \Lambda = .997, partial \eta^2 = .003, power = .575$, indicating there was no evidence of a difference in the combined constructs of the cognitive, psychomotor and affective domains between AD and BD graduates as perceived by graduates.

To further investigate whether differences existed between program type and each of the individual constructs, Welch F tests were performed. Welch's F tests were used to assess mean differences using a more robust estimation when the assumption of

homogeneity of variance has been violated (Field, 2009; Warner, 2013). Significant differences between program type were obtained for constructs of cognitive skills, asymptotic $F(1, 509.89) = 8.82, p = .003, \omega^2 = .002$, and psychomotor skills, asymptotic $F(1, 509.89) = 7.17, p = .008, \omega^2 = .002$. Differences between program type and affective skills were not significant, asymptotic $F(1, 509.89) = 3.23, p = .071, \omega^2 = .002$. The effect size as assessed by ω^2 was very small (Warner, 2013). As a result these findings should be interpreted with caution.

Post-hoc independent sample t-tests (equal variances not assumed) indicated significant differences between AD and BD graduate surveys. Associate degree graduate surveys had statistically significant lower mean ratings for cognitive skills and psychomotor skills than baccalaureate degree graduate survey ratings. Although associate degree graduate surveys had lower mean ratings for affective skills, these differences were not significant. Table 5 displays the means, standard deviations, and differences for the comparisons between AD and BD program constructs using the 95% confidence interval.

Overall Graduate Survey Rating

The next analysis examined in this study explored whether there was a relationship between the preparation of associate and baccalaureate degree prepared graduates measured by the overall graduate survey ratings. A Welch's F test was performed because it is a more robust test when sample sizes are unequal. The Welch's F test was significant, asymptotic $F(1, 507.72) = 11.37, p = .001, \omega^2 = .003$, indicating that there was a difference between associate and baccalaureate degree graduates perception of the programs ability to prepare them for entry into the profession. However, the effect

size between program type and overall graduate survey ratings assessed by ω^2 was very small (Warner, 2013).

Table 5
AD vs. BD Construct Means, Standard Deviations, Differences, Confidence Intervals and Cohen's d

	Type	M (SD)	Difference Sig.	95% CI		<i>d</i>
				LL	UL	
Cognitive Skills	AD ^a	4.57 (0.61)	-0.09, p = .003	4.55	4.60	0.15
	BD ^b	4.66 (0.47)		4.61	4.71	
Psychomotor Skills	AD ^a	4.56 (0.63)	-0.09, p = .008	4.53	4.59	0.14
	BD ^b	4.65 (.54)		4.59	4.71	
Affective Skills	AD ^a	4.52 (0.63)	-0.06, p = .071	4.49	4.55	0.10
	BD ^b	4.58 (0.54)		4.52	4.64	

Note. AD = associate degree, BD = baccalaureate degree, sig. = significance, CI = confidence interval, LL = lower limit, UL = upper limit.

^an = 1993. ^bn = 322.

Post-hoc independent sample t-tests (equal variances not assumed) indicated a significant difference between AD and BD overall graduate survey rating. The overall graduate survey ratings had statistically significant lower mean ratings for associate degree programs than for baccalaureate degree programs. Table 6 displays the overall graduate survey means, effect size (Cohen's *d*) and standard deviations for comparisons using the 95% confidence interval.

Table 6

AD vs. BD Overall Graduate Survey Rating Means, Standard Deviation, Confidence Intervals and Cohen's d

	Type	M (SD)	Differences (significance)	95% CI		<i>d</i>
				LL	UL	
Overall Rating	AD ^a	4.39 (0.81)	-0.14, (<i>p</i> = .001)	4.36	4.43	0.17
	BD ^b	4.53 (0.63)		4.46	4.60	

Note. AD = associate degree, BD = baccalaureate degree, CI = confidence interval, LL = lower limit, UL = upper limit.

^a*n* = 1933. ^b*n* = 322.

Research Question 1b. Employer Survey Comparisons

The third analysis explored whether there was an association between the preparation of associate and baccalaureate degree program graduates in regard to the combined level two constructs of the cognitive, psychomotor and affective domains assessed by the employer surveys. Type III sums of squares were used to correct for the unequal sample sizes.

The Levene's test was significant for three constructs ($p < .05$). Research has shown that large deviations of variance seldom have much effect on the interpretation of results (Mertler & Vannata, 2005; Warner, 2013). Therefore results from the MANOVA test were examined. A statistically significant difference was found between AD and BD employer survey ratings in the combined constructs (cognitive, psychomotor and affective domains), $F(3, 1887) = 8.16, p < .001$; *Wilk's Λ* = .987, *partial η^2* = .013. Power to detect the effect was large (.992), although effect size as indicated by *partial η^2* was small. As a result these findings should be interpreted with caution (Warner, 2013).

Given the significance of the omnibus test and high power to detect, results from the post hoc univariate ANOVA were examined. Statistically significant differences were

found between program type for cognitive skills, $F(1, 1889) = 21.47, p < .001, \text{partial } \eta^2 = .011, \text{power} = .996$; psychomotor skills, $F(1, 1889) = 24.14, p < .001, \text{partial } \eta^2 = .013, \text{power} = .998$; and affective skills, $F(1, 1889) = 15.92, p < .001, \text{partial } \eta^2 = .008, \text{power} = .979$. Although the power to detect the results were large, effect sizes were small (Warner, 2013).

Least Significant Difference (LSD) post hoc tests indicated a statistically significant difference between AD and BD employer surveys. Associate degree employer surveys had lower mean ratings for cognitive, psychomotor, and affective domains than baccalaureate degree employer survey ratings. Table 7 displays means, standard deviations, effect size (Cohen's d) and differences for pairwise comparisons using the 95% confidence interval.

Table 7

AD vs. BD Employer Survey Construct Estimated Means, Confidence Intervals and Cohen's d

	Type	Mean (SD)	Differences (sig.)	95%CI		d
				LL	UL	
Cognitive Skills	AD	4.26 (0.02)	-0.19 ($p < .001$)	4.22	4.29	0.29
	BD	4.44 (0.04)		4.37	4.51	
Psychomotor Skills	AD	4.31 (0.02)	-0.20 ($p < .001$)	4.27	4.34	0.30
	BD	4.51 (0.04)		4.44	4.58	
Affective Skills	AD	4.50 (0.02)	-0.14 ($p < .001$)	4.47	4.52	0.23
	BD	4.64 (0.03)		4.58	4.71	

Note. AD = associate degree, BD = baccalaureate degree, sig. = significance, CI = confidence interval, LL = lower limit, UL: = upper limit.

^an = 1562. ^bn = 329.

Overall Employer Survey Rating

The fourth analysis examined in this study included the variables of the overall employer survey rating (dependent variable) and program type (AD vs. BD) as the independent variable. This analysis explored whether there was a significant difference between the employers perception of the preparation of associate and baccalaureate degree graduates in regard to the overall employer survey ratings.

A Welch's F test was performed because it is a more robust test when sample sizes are unequal. Results from the Welch's F test were statistically significant, asymptotic $F(1, 536.08) = 39.10$, $p < .001$, $\omega^2 = .02$, indicating that there was a difference between associate and baccalaureate degree graduates perception of the programs ability to prepare them for entry into the profession. The effect size of the relationship between program type and overall survey ratings assessed by ω^2 was small (Warner, 2013).

Post hoc independent sample t-tests (equal variances not assumed) indicated a significant difference between AD and BD overall employer survey rating. The overall employer survey ratings were significantly lower for associate degree programs than for baccalaureate degree programs. Table 8 displays means, standard deviations, effect size (Cohen's d) and differences for pairwise comparisons using the 95% confidence interval.

Table 8

AD vs. BD Overall Employer Survey Rating Means, Standard Deviation, Confidence Intervals and Cohen's d

	Type	M (SD)	Differences (sig.)	95% CI		d
				LL	UL	
Overall Rating	AD	4.21 (0.82)	-0.28,	4.17	4.25	0.35
	BD	4.49 (0.71)	(p<.001)	4.40	4.56	

Note. AD = associate degree, BD = baccalaureate degree, CI = confidence interval, LL = lower limit, UL = upper limit.

^an = 1562. ^bn = 329.

Research Question 2. Graduate vs. Employer Survey Comparisons

Associate and Baccalaureate Degree Comparisons

The next set of variables examined in this study included the level two constructs of cognitive skills, psychomotor skills, and affective skills as the dependent variables and survey type (combined AD and BD graduate vs. employer) as the independent variable. This analysis explored whether there was a difference between graduate and employer perceptions of the preparation of respiratory therapy program graduates by comparing graduate and employer survey ratings. Type III sums of squares were used to correct for the unequal sample sizes.

Although the Levene's test was significant for cognitive and psychomotor skills, research has shown that variances seldom have much effect on the interpretation of results, therefore results therefore results from the MANOVA test were examined (Mertler & Vannata, 2005; Warner, 2013). There was evidence of a statistically significant difference between graduate and employer survey ratings in the combined constructs of cognitive skills, psychomotor skills, and affective skills, $F(3, 4202) = 177.15, p < .001; Wilk's \Lambda = .888, partial \eta^2 = .12, power = 1.0$.

Given the significance of the omnibus test and high power to detect, results from the post hoc univariate ANOVA were examined. Statistically significant differences between survey type (graduate vs. employer) were obtained for cognitive skills, $F(1, 4202) = 231.83, p < .001, \text{partial } \eta^2 = .06, \text{power} = 1.0$ and psychomotor skills, $F(1, 4202) = 130.67, p < .001, \text{partial } \eta^2 = .03, \text{power} = 1.0$. Effect size assessed by *partial* η^2 and power for cognitive and psychomotor skills were large. There was no evidence of a difference between survey type for the construct of affective skills, $F(1, 4202) = 0.13, p = .72, \text{partial } \eta^2 = .000, \text{power} = .07$, however the effect size assessed by *partial* η^2 was negligible and the power to detect was moderate (Warner, 2013). Therefore the results from the construct of affective skills should be interpreted with caution.

Table 9

AD&BD Employer vs. Graduate Estimated Means, Differences, Confidence Intervals and Cohen's d

	Type	M (SE)	Difference (sig.)	95% CI		<i>d</i>
				LL	UL	
Cognitive Skills	Employer	4.29 (0.02)	-0.29	4.26	4.32	0.46
	Graduate	4.58 (0.01)	($p < .001$)	4.56	4.61	
Psychomotor Skills	Employer	4.34 (0.02)	-0.23	4.31	4.37	0.36
	Graduate	4.57 (0.01)	($p < .001$)	4.55	4.60	
Affective Skills	Employer	4.52 (0.01)	-0.01	4.49	4.55	0.02
	Graduate	4.53 (0.01)	($p = .72$)	4.50	4.55	

Note. AD = associate degree, BD = baccalaureate degree, sig. = significance, CI = confidence interval, LL = lower limit, UL = upper limit.

^an = 1891. ^bn = 2315.

Least Significant Difference (LSD) post hoc tests indicated a significant pairwise difference between graduate and employer surveys for the constructs of cognitive skills, psychomotor skills and affective skills. Employer surveys had lower mean ratings for cognitive skills and psychomotor skills than graduate survey ratings. Employer surveys had lower mean ratings for affective skills than graduate survey ratings but differences were not significant. Table 9 displays means, standard error, effect size (Cohen's *d*) and differences for pairwise comparisons using the 95% confidence interval.

Associate Degree Comparisons

To further investigate the relationship between graduate and employer surveys, two separate sets of variables were examined. The first set of variables included the level two constructs from the associate degree survey (cognitive, psychomotor, and affective skills) as the dependent variables and survey type (graduate vs. employer) as the independent variable. This analysis explored whether there was a difference between graduate and employer perceptions of the preparation of associate degree graduates by comparing graduate and employer survey ratings. Type III sums of squares were used to correct for the unequal sample sizes.

Although the Levene's test was significant for the constructs of cognitive skills and psychomotor skills, research has shown that variances seldom have much effect on the interpretation of results, therefore results from the MANOVA test were examined (Mertler & Vannata, 2005; Warner, 2013). A statistically significant difference between associate degree graduate and employer survey ratings was found for the combined (cognitive, psychomotor, and affective) constructs, $F(3, 3120) = 129.39$,

$p < .001$; *Wilk's A* = .89, *partial* η^2 = .11, power = 1.00. Effect size assessed by *partial* η^2 and power were large (Warner, 2013).

Given the significance of the overall test and power to detect, post hoc univariate ANOVA results were examined. Statistically significant differences between AD survey type (graduate vs. employer) were obtained for cognitive skills, $F(1, 3122) = 181.72$, $p < .001$, *partial* η^2 = .06, power = 1.0 and psychomotor skills, $F(1, 3122) = 107.41$, $p < .001$, *partial* η^2 = .03, power = 1.0. There was no evidence of a significant difference between survey type for affective skills, $F(1, 3122) = 0.77$, $p = .38$, *partial* η^2 = .000, power = 0.14, however, effect size and power were very small (Warner, 2013).

Table 10
AD Employer vs. Graduate Surveys Estimated Means, Differences, Confidence Intervals and Cohen's d.

	Type	M (SE)	Difference (sig.)	95%CI		<i>d</i>
				LL	UL	
Cognitive Skills	Employer ^a	4.26 (0.16)	-0.31 (p<.001)	4.22	4.29	0.48
	Graduate ^b	4.57 (0.16)		4.54	4.60	
Psychomotor Skills	Employer ^a	4.31 (0.17)	-0.24 (p<.001)	4.28	4.34	0.36
	Graduate ^b	4.55 (0.17)		4.52	4.59	
Affective Skills	Employer ^a	4.50 (0.16)	-0.01, (p=.38)	4.47	4.53	0.02
	Graduate ^b	4.51(0.16)		4.49	4.55	

Note. AD = associate degree, sig. = significance, CI = confidence interval, LL = lower limit, UL = upper limit.

^an = 1891. ^bn = 2315.

Least Significant Difference (LSD) post hoc tests indicated a statistically significant difference between AD graduate and employer surveys for the constructs of cognitive skills and psychomotor skills. Employer surveys had lower mean ratings for cognitive skills and psychomotor skills. Employer survey affective skills mean ratings

were lower than graduate survey ratings but these differences were not statistically significant (See Table 10).

Baccalaureate Degree Comparisons

The relationship between the level two constructs from the baccalaureate degree surveys (cognitive, psychomotor, and affective skills) and survey type (graduate vs. employer) was also examined. This analysis explored whether there was a difference between graduate and employer perceptions of the preparation of baccalaureate degree graduates by comparing graduate and employer survey ratings. Type III sums of squares were used to correct for the unequal sample sizes, that is, the *SS* for each effect was calculated controlling for all other effects.

The Levene's test was significant, however, research has shown that variances seldom have much effect on the interpretation of results, therefore results therefore results from the MANOVA test were examined (Mertler & Vannata, 2005; Warner, 2013). The test was significant, $F(3, 1078) = 36.72, p < .001$; *Wilk's Λ* = .91, *partial η^2* = .09. Effect size as assessed by *partial η^2* and power to detect the effect was large (Warner, 2013).

Given the significance of the omnibus test and power to detect, post hoc univariate ANOVA results were examined. Statistically significant differences between baccalaureate degree survey type (graduate vs. employer) were obtained for cognitive skills, $F(1, 1080) = 22.81, p < .001, partial \eta^2 = .021, power = .998$; psychomotor skills, $F(1, 1080) = 6.83, p = .009, partial \eta^2 = .006, power = 0.74$; and affective skills, $F(1, 1080) = 5.531, p = .019, partial \eta^2 = .005, power = 0.65$.

Least Significant Difference (LSD) post hoc tests indicated a significant difference between BD graduate and employer surveys for the constructs of cognitive skills and psychomotor skills. Employer surveys had lower mean ratings for cognitive skills and psychomotor skills; whereas graduate survey ratings were lower than employer survey ratings for affective skills. Table 9 displays means, standard deviations, effect size (Cohen's *d*) and differences for pairwise comparisons using the 95% confidence interval.

Table 11

*BD Employer vs. Graduate Surveys Estimated Means, Differences, Confidence Intervals and Cohen's *d**

	Type	M (SE)	Difference (sig.)	95%CI		<i>d</i>
				LL	UL	
Cognitive Skills	Employer ^a	4.44 (0.31)	-0.18	4.32	4.50	0.28
	Graduate ^b	4.62 (0.02)	(<i>p</i> <.001)	4.58	4.66	
Psychomotor Skills	Employer ^a	4.51 (0.03)	-0.10	4.44	4.57	0.15
	Graduate ^b	4.61 (0.02)	(<i>p</i> =.01)	4.57	4.65	
Affective Skills	Employer ^a	4.64 (0.03)	-0.09	4.58	4.70	0.14
	Graduate ^b	4.55 (0.02)	(<i>p</i> =.02)	4.51	4.60	

Note. BD = baccalaureate degree, sig. = significance, CI = confidence interval, LL = lower limit, UL = upper limit.

^a*n* = 1891. ^b*n* = 2315.

Research Question 3. Credentialing Success

The next data set examined in this study included credentialing success information gathered from all accredited respiratory therapy programs. The data, displayed as the percentage of graduates attaining the RRT credential from each program were generated from the 2014 Report on Accreditation located on the CoARC website. Data were reported in aggregate form incorporating the three-year time period of 2011 through 2013.

The final analysis in this study utilized a Mann-Whitney test with credentialing success (% RRT credential) as the testing variable and program type (AD vs. BD) as the grouping variable. A statistically significant difference between associate degree and baccalaureate degree and percent RRT success was found, $z = -5.95$, $p < .001$, $r = .29$. Although the test was significant, the portion of variance in RRT success that existed between program type was only 29 percent. Table 12 shows mean ranks, Mann-Whitney U and Wilcoxon W scores.

Table 12

AD vs. BD Credentialing Success Mean Rank, Mann-Whitney U and Wilcoxon W scores

	N	Mean Rank	U	W	z	p
AS	361	195.54	5250.00	70591.00	-5.95	< .001*
BS	57	297.89				

Note. AD = associate degree, BD = baccalaureate degree, U = Mann-Whitney U, W = Wilcoxon W.

*Asymptotic Sig. 2-tail

Research Question 4. Document Analysis of Associate and Baccalaureate Degree Respiratory Therapy Programs

To present a more detailed description of the different mission, values, learning outcomes and coursework required by each program type, documents acquired from 22 associate degree and 22 baccalaureate degree institutional websites were reviewed (See Appendix C). Analyses of these documents were explored to determine whether there were differences in mission, values, learning outcomes and coursework between associate and baccalaureate degree programs.

The 2010 CoARC accreditation standards for the profession of respiratory therapy do not differentiate between associate degree and baccalaureate degree curriculum requirements. Rather, accreditation guidelines list 12 minimum curriculum standards that

all programs must include in order to maintain accreditation. Specifically standards 4.04 and 4.05 state:

The curriculum must include content in the following areas: oral and written communication skills, social/affective sciences, biomedical/natural sciences, and respiratory care. This content must be integrated to ensure achievement of the curriculum's defined competencies. Biomedical/natural sciences content must include human anatomy and physiology, cardiopulmonary anatomy and physiology, cardiopulmonary pathophysiology, chemistry, physics, microbiology, and pharmacology (p.23).

Additionally, standard 4.06 states that respiratory therapy programs must include:

...care of the adult, pediatric and newborn patient, health promotion, education, and disease management; fundamental principles of healthcare reimbursement; fundamental principles of evaluating current scientific literature; medical ethics; provision of health care services to patients with transmissible diseases; provision of services for and management of patients with special needs; community respiratory health; medical emergencies; and legal and ethical aspects of respiratory care practice (p. 24).

Although all accredited programs must include these minimum standards, the curriculum and total number of credits for each individual program are highly variable as the specific content of the curriculum are dependent on the institution type, the institutions mission and core values and the program's community of interest.

Institution and Program Mission, Values, and Goals

Document analysis of the programs studied revealed various institutional and program missions, values, and learning outcomes. However several themes emerged that differentiated two-year institutions from four-year institutions. The first theme that emerged was a mirroring of institutional and program missions. For example, in Table 13 the institutional mission of College X – *to provide educational opportunities to improve quality of life and sustainable Community building and citizenship* – mirrors the RT program mission– *to contribute to the healthcare needs of the community by preparing graduates in the practice of their profession* as respiratory care practitioners.

Similarly, as shown in Table 14, the mission of University Y – *to advance knowledge through excellence in learning, discovery and engagement*; and to serve as a *research university*, mirrors that of the RT Program – *to provide quality graduates through continuous commitment to Education, Research and Service*. Upon further comparison it was noted that, AD and BD RT programs appear to focus on different educational mission and values. For example, in Table 13, AD (College X) institution and program mission/value statements focused on academic or occupational objectives through an open access admission policy. Whereas as shown in Table 14, BD institution and programs mission/value statements focused on fostering academic excellence, intellectual inquiry, leadership and research grounded in a liberal arts education. Therefore, it appears that AD programs are focused on access and the development of technical competence whereas BD programs focus on academic excellence and the development of professional skills.

Table 13

College X

Institution Mission and Values

Program Mission and Goals

Institution Mission:

With a mission of student success College X provides educational opportunities to improve quality of life and sustainable Community building and citizenship. The college is a premier public comprehensive two-year institution that provides academic transfer, vocational, continuing education and basic skills education for the citizens of the local community, county, state and the world.

Institution Values:

In support of our Mission, the college holds the following as the core values guiding our activities:

- Promote personal, professional and academic growth of the entire college community
- Provide open access and affordability
- Enhance a culture of trust, respect, and open communication among all participants
- Encourage diversity of thought, culture, and experience
- Plan for the future in a context that reflects flexibility, innovation, tradition, and sustainability
- Provide service to community
- Embrace accountability and responsibility
- Foster and maintain an enriching campus environment
- Celebrate and reward excellence

Program Mission:

The mission of the Respiratory Therapy Program is to contribute to the healthcare needs of the community by preparing graduates in the practice of their profession as respiratory care practitioners.

Program Goals:

The Respiratory Therapy Program seeks to prepare graduates with demonstrated competence in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains of respiratory care practice as performed by registered respiratory therapists (RRTs).

Table 14

University Y

Institution Mission and Values

Program Mission and Goals

Institution Mission

The mission of University Y is to improve the human condition; to advance knowledge through excellence in learning, discovery and engagement; and to serve as a diverse, student-centered public metropolitan research university.

Institution Values

- Treat all with compassion, professionalism and respect
- Vigorously pursue and widely share new knowledge; expand understanding of existing knowledge; develop knowledge, skills, and competencies of students, faculty, staff and the community while promoting a community of lifelong learning.
- Create an environment that values diversity, integrity and teamwork
- Provide student, regional and global engagement, outreach and service
- Strive, individually and collectively, to achieve the highest level of focus, quality and pride in all endeavors; continuously engage in improvement, innovation and responsibility
- Promote wellness, healing and safety for those in need including students, faculty, staff, as well as those in the community and around the world

Program Mission

The Respiratory Therapy Program is dedicated to provide quality graduates in the profession of respiratory therapy through continuous commitment to Education, Research and Service. The program is committed to; fostering learning, contributing to the professional knowledge base, and providing collaborative service and engagement with the University, local community, state, nation, and international partners.

Program Goal

The goal of the Respiratory Care Program is to prepare graduates with demonstrated competence in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains of respiratory care practice.

Institution and Program Learning Outcomes

The second theme that emerged was that specific learning outcomes, content and curricula of AD and BD programs appeared to be driven by the institution's mission, values, and the program's communities of interest. For example, in Table 15, learning outcomes from College X's RT program outcomes appeared to have a more limited focus on cognitive, technical, and professional skills required for entry into the profession with

the focus of job attainment. In contrast, learning outcomes for BD programs focused on critical thinking, communication and professional skills, in addition to expanded roles such as management, leadership, and teaching skills. These findings suggest that BD programs concentrate on preparing graduates with a deeper breadth of clinical practice by providing them with the level of education and training to meet current and future demands of the profession.

Table 15

AD and BD Program Outcome Comparisons

College X	University Y
Upon completion of the program, students will demonstrate professional behavior consistent with employer expectations as entry level respiratory therapists as evidenced by future evaluation surveys.	Upon completion of the program, students will be prepared for the expanded role in patient care which is predicted for the respiratory therapist of the future.
Upon completion of the program, students will demonstrate the ability to comprehend, apply, and evaluate clinical information relevant to their roles as entry-level respiratory therapists as evidenced by future evaluation surveys.	Upon completion of the program, students will demonstrate the ability to perform patient assessments, assist in developing and implementing patient care plans, and participate in disease management and therapist-driven protocols.
Upon completion of the program, students will demonstrate the technical proficiency in all of the skills necessary to fulfill the roles as an entry-level respiratory therapist as evidenced by future evaluation surveys.	Upon completion of the program students will be prepared to pass the Entry Level (CRT) examination and the Advanced Practitioner (RRT) examinations administered by the National Board for Respiratory Care (NBRC)

Note. AD = associate degree, BD = baccalaureate degree.

Admission Criteria

Additional themes such as differences in admission criteria, credit requirements and duration of programs between associate and baccalaureate degree programs also emerged. The research revealed that admission criteria for AD programs consisted of high school grade point average (GPA), ACT scores and completion of general prerequisite courses. In contrast to AD programs, BD program admission criteria consisted of overall college pre-requisite GPA and science GPA with many programs requiring interviews, letters of recommendation and personal statements from the applicant. Therefore, it appears that BD programs have more stringent admission criteria than AD programs therefore may admit students that are more prepared for the rigorous curriculum required for preparing graduates with the knowledge, skills, and attitudes required for entry into the profession.

Credit Requirements and Duration of Programs

The total number of semester hour credits required for an associate degree ranged from 63 to 99 (average 79) including general education requirements and prerequisites. While some programs allowed general education requirements and prerequisite courses to be taken concurrent with respiratory therapy core course, others required general education courses and prerequisites to be taken prior to acceptance into the program. In general approximately 40% (26-32 credits) of the courses required for an associate's degree consist of general education and prerequisite courses whereas 60% (47-53 credits) consisted of core professional or respiratory therapy courses. Although the minimum length of an associate's degree program is currently two years, programs that required

more than 70 credits were three full years or up to eight semesters (including summers) in length.

The number of semester hour credits required for a baccalaureate degree in respiratory therapy ranged from 120 to 148 (average 128), including general education requirements and prerequisite courses. The average length of BD respiratory therapy programs was nine semesters taken throughout a four year time period. The major curriculum format of BD respiratory therapy programs was a two-year pre-professional curriculum as a prerequisite for the two year professional respiratory therapy curriculum. However, some programs offered respiratory therapy courses throughout all four years of the program, whereas other programs offered respiratory course in the second year of college.

Although the percentage of core and general education requirements compared to total credits were similar for AD and BD programs, the number of general education requirements for BD programs were two times that of AD programs. Approximately 45% (52-66.6 semester credit hours) of BD programs consisted of respiratory therapy core requirements whereas 55% (66-81.4 semester hour credits) consisted of general education requirements. While AD and BD programs provide similar respiratory therapy core requirements, BD programs provided more content in the social and natural sciences and additional humanities, ethics, and professional courses prior to entering the professional phase (respiratory therapy content) of the program. Therefore it is conceivable that the content of the core respiratory therapy requirements for BD program may have been delivered at a higher level.

Respiratory Therapy General Education Requirements

Other pertinent findings that emerged from the evaluation of program documents included the similarities and differences in AD and BD program course requirements. These findings included differences in general education requirements, as well as similarities and differences in respiratory therapy core course content. Results from the analysis of program curricula showed that AD respiratory therapy programs required less general education courses than BD programs. General education requirements for AD programs typically consisted of one college level math course, one course in the social sciences, one English composition course, two semesters of human anatomy and physiology and one semester of chemistry. In contrast, general education requirements for a baccalaureate degree in respiratory therapy consisted of courses in biology, human anatomy and physiology, microbiology, chemistry and physics which provided the science foundation that is expected to enhance the respiratory therapy curriculum, which is highly science-based. Additional general education requirements consisted of courses in English composition, communication, and mathematics. Table 16 shows comparisons of College X and University Y general education and prerequisites for a typical AD and BD respiratory therapy program. College X provided 34 semester hour credits of general education requirements whereas University Y provided 58 semester hours of general education requirements.

Although general education requirements vary between different institutions depending on the mission and values for type of college (two-year or four-year), four-year institutions typically required more general education courses than two-year institutions. Research has shown that courses in the social sciences and humanities such

as psychology, philosophy, and ethics, characteristically provide the foundation for the *art of patient care*, with the expectation that graduates would develop a better understanding of the cultural, economic, political and social issues that affect patients and influence healthcare (Darbyshire, 1994, 1995; Shapiro & Rucker, 2003).

Table 16

College X and University Y General Education & Prerequisite Semester Credit Hours Comparison

College X (Total Credits =34)	University Y (Total Credits =58)
Math – Problem Solving* – 3	College Algebra – 3
Human Anatomy (+ lab)* – 4	Anatomy & Physiology I (+ lab) – 4
Human Physiology (+ lab)* – 4	Anatomy & Physiology II (+ lab) – 4
Physics or Basic Chemistry (+lab) - 4	Chemistry (+ lab) – 4
Medical Terminology* – 3	Comp. I – 3
Comp. I* – 3	Comp, II – 3
Comp II – 3	Critical Thinking – 3
Humanities – 10	Microbiology – 3
	Medical Ethics – 3
	Psychology – 3
	Medical Terminology – 3
	Computers - 3
	Humanities Electives – 16
	Professional Elective – 3

Note. Comp. = composition, A&P = anatomy and physiology

**Must be completed prior to admission to program*

Respiratory Therapy Core Requirements

Analysis of the respiratory core curriculum from AD and BD programs revealed that AD and BD programs included all content specified by the CoARC 2010 accreditation standards. Coursework common to both AD and BD curricula included cardiopulmonary anatomy and physiology, cardiopulmonary pharmacology, patient assessment and diagnostic techniques, lung function testing, respiratory disease pathology and treatment, basic equipment and techniques, and airway management including invasive and non-invasive ventilation strategies. Both AD and BD curriculum

also provided hands-on patient care in the clinical environment as well as education for the care of the adult, pediatric and neonatal patient. For example, as shown in Table 17, College X provided 47 semester credit hours of RT core requirements for a total of 81 credits. In contrast, University Y provided 62 semester credit hours of core RT requirements for a total of 120 credits.

Table 17

College X and University Y RT Core Semester Credit Hours Comparison

College X (Total Credits =47)	University Y (Total Credits =62)
Introduction to RT – 3	Cardiopulmonary A&P – 4
Cardiopulmonary A&P – 2	Basic Clinical Assessment – 4
RT Equipment/Procedures – (+lab) – 4	RT Diseases I – 4
Clinical Practicum I – 3	RT Equipment/Procedures – 7
RT Pharmacology - 2	Cardiopulmonary Diagnostics I – 4
RT Advanced Procedures II – (+lab) – 4	RT Diseases II - 4
Clinical Practicum II – 4	RT Advanced Procedures– 7
Resp. Pathology – 2	Advanced Cardiopulmonary Diagnostics – 3
RT Specialty Practicum – 3	Clinical Practice I – 4
RT Diagnostic Procedures III – (+lab) – 4	RT Neonatal/Pediatrics – 4
RT Pediatrics & Neonatology – 2	Advanced Clinical Assessment – 3
Resp. Practicum III - 4	RT Research Analysis – 3
RT Procedures IV – (+lab) – 4	ACLS – 1
Clinical Practicum IV – 4	Clinical Practice II – 3
RT Exam Prep – 2	RT Alternate Sites – 3
	Issues in Professional Practice – 3
	Professional Practice Prep – 1

Note. RT = respiratory therapy, ACLS = advanced cardiac life support.

CoARC curriculum guidelines also require programs to prepare graduates that are competent in interpersonal and communication skills in order to develop the skills necessary to interact with diverse population groups and to be competent in problem solving strategies in the patient care setting (CoARC, 2010). Document analysis revealed that AD curricula contained content that included critical thinking, problem solving, and

interpersonal communication in the description of courses. In contrast, the liberal arts requirements for BD programs provided courses in oral and written communication as well as in the social and natural sciences. Baccalaureate degree programs also provided courses or course content related to health promotion, disease prevention, the research process, and leadership and management skills. In other words, core coursework provided by AD programs provided the minimum content required for accreditation, whereas BD programs provided coursework that went above the minimum content required for accreditation.

Baccalaureate Degree Completion Programs

In order to provide a more detailed description of the differences between AD and BD program curriculum, a document analysis of baccalaureate degree completion programs was also completed. Baccalaureate degree completion programs are designed to offer students with an associate degree in respiratory therapy the opportunity to obtain a baccalaureate degree from a four-year college or university. Similar to AD and BD programs, mission statements from BD completion programs mirrored that of the institution that offered the degree. The main focus of a baccalaureate completion program was to build upon the existing clinical knowledge and skills of working therapists by improving written and oral communication skills as well as to provide graduates with opportunities for career advancement. Learning outcomes for BD completion programs were similar to that of a typical BD program. For example, the learning outcomes for University Z were:

1. Students will articulate various current professional and clinical roles and potential expanded roles related to the RT profession including describing professional behavior, reviewing the history of respiratory therapy, monitoring the quality of respiratory care and listing changes in technology and knowledge base.
2. Students will demonstrate knowledge in critical care pathophysiology to interpret pertinent clinical information to make recommendations for appropriate therapeutic intervention.
3. Students will demonstrate effective written and oral communication skills.
4. Students will demonstrate the ability to access, interpret, and critically appraise relevant medical and other authoritative literature related to clinical practice, administration, education, and/or research associated with the RT profession.
5. Students will develop an original project or research proposal related to clinical practice, administration, education and/or research associates with the RT profession.

To be considered for admission into a BD completion program, applicants were required to hold a current unencumbered license as a respiratory therapist from the state the program was located in. Students also needed to have a cumulative GPA of 2.0 or better from an accredited AD program and acceptance to the institution supplying the BD. CoBGRTE (2015) provided a list of 33 four-year institutions in the United States that offered baccalaureate degree completion programs. Analysis of the BD completion programs revealed that courses such as oral and/or written communication courses; social

science courses such as sociology, psychology and/or anthropology; and natural science courses such as chemistry, microbiology, and physics were typically required in addition to advanced core RT coursework.

As shown in Table 18, the total credit hours required for a BD completion program varied depending on the number of credits accrued in the AD respiratory therapy curriculum and the curriculum requirements for the institution granting the degree. As AD program curriculum vary from program to program, pre-requisite and core coursework required for BD completion programs are typically personalized to individual students. For example, a student who graduated from College X applying for a BD from University Z may be required to take general education courses such as college algebra, physics, microbiology, ethics, introduction to computers, and humanities to meet the requirements for University Z. Core requirements may include courses such as advanced assessment and monitoring, advanced critical care, research, patient education, health promotion, leadership and management Clinical courses students are required to take to obtain a BD at University Z will depend on the competence of the student and may include additional training in emergency and critical care units of the hospital as well as alternate sites such as COPD and asthma clinics, tobacco education, and pulmonary rehabilitation and home care.

Research has shown that liberal arts courses are important for the development of communication skills, higher order thinking skills, and skills necessary to work independently and foster life-long learning (Tsui, 1999). Additionally, a more rigorous background in the natural sciences has been shown to improve critical thinking and the

ability to incorporate knowledge learned in the classroom to the patient care setting (Wettstein, et al., 2001).

Table 18

University Z BD Completion Program Curriculum Requirements

AD transfer credits – up to 60

General Education Credits^a – up to 43

- Fundamental skills (9-12 credits)
 - Composition, Math, and Computer courses
- Natural and Social Science (10 credits)
 - 2-Natural science courses, 1-Social science course
- Communication skills (6-9 credits)
 - Written and Oral

RT credits – 38

- Professional Development – 3
- RT in Alternate Sites – 3
- Advanced Pharmacology – 3
- Advanced Cardiopulmonary Physiology – 3
- Advanced Critical Care Monitoring – 3
- Evidenced Based Practice – 3
- Leadership and Management – 3
- Research – 3
- Information Technology in Health Care – 2
- Advanced Critical Care Pathophysiology – 3
- RT Capstone - 9

Total credits – 120-130^b

*Note.*BD = baccalaureate degree, AD = associate degree.

^aGeneral education requirements can be transferred from AD.

^bThe total number of credits is determined my credits transferred from AD.

Summary

This chapter presented findings from various one-way multivariate and univariate ANOVAs and post hoc tests as well as a Mann-Whitney two-sample test to compare associate and baccalaureate degree respiratory therapy programs ability to prepare graduates with the competencies required for practice. A document analysis of associate and baccalaureate degree program web-sites was also undertaken to explore similarities

and differences in mission, vision, learning outcomes and coursework between the two program types.

In regard to the MANOVA findings, differences were found between AD and BD employer surveys in the combined construct domains (cognitive, psychomotor and affective skills), whereas the findings from the MANOVA test for the graduate surveys were not significant. Overall, employers rated baccalaureate degree graduates slightly higher than associate degree graduates in each of the three skill domains. Overall, graduate survey ratings from baccalaureate graduates were slightly higher than associate graduates for the three skill domains, however; only the constructs of cognitive and psychomotor skills were statistically significant. In general, employers rated the preparation of baccalaureate degree graduates slightly higher than the associate degree graduates in all three skill domains whereas baccalaureate degree graduates rated their preparation in the cognitive and psychomotor skill domains slightly higher than associate degree graduates.

In regards to the relationship between the overall employer and overall graduate survey ratings, findings from the Welch's F tests revealed a difference between associate and baccalaureate degree survey ratings. Overall ratings for the preparation of baccalaureate degree graduates were slightly higher than the overall ratings for the associate degree graduates.

To examine the relationship between graduate and employer survey ratings, MANOVA tests were also performed. In these analyses, differences were found between graduate and employer surveys in the constructs of cognitive, psychomotor and affective skills. Overall employer survey ratings were consistently lower than graduate survey

ratings in the constructs of cognitive, psychomotor and affective skills in the combined AD and BD analysis, as well as the individual AD analysis. Interestingly, employer survey ratings were lower than graduate survey ratings in the cognitive and psychomotor domains from the individual BD analysis. However employer survey ratings were higher than graduate survey ratings in the affective domain from the individual BD analysis.

A Mann-Whitney two-sample test was used to compare the percentage of graduates attaining the RRT credential one-year post graduation between associate degree and baccalaureate degree programs. Results from the Mann-Whitney test found that a slightly higher percentage of BD graduates attained the RRT credential than AD programs.

Finally, an exploration of various associate degree and baccalaureate degree program websites revealed considerable differences in the mission, values, learning outcomes required by each program type. Although all accredited respiratory therapy programs are required at minimum to include content in the areas of oral and written communication skills, social and affective science content, biomedical and natural science content as well as certain core course requirements listed in standard 4.06, BD programs required courses beyond the minimum general education, prerequisite, and core respiratory therapy course requirements. Interestingly, many associate degree programs are eight semesters or three years in length, which is equivalent to semester length of most baccalaureate degree programs. All of these findings and their implications are further explored in the next chapter.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This study employed quantitative analyses to compare the perceptions of associate degree graduates and their employers with the perceptions of baccalaureate degree graduates and their employers regarding the educational program's ability to prepare graduates for entry into the profession. Graduate and employer ratings of cognitive, psychomotor, and affective competencies obtained from the follow-up surveys from 16 baccalaureate degree and 88 associate degree respiratory therapy programs were analyzed to determine whether there were perceived differences in preparation of associate and baccalaureate degree graduates. Credentialing success data for graduates of 361 associate degree and 57 baccalaureate degree respiratory therapy programs were also analyzed to determine whether differences in program type had an effect on RRT credentialing success. Additional information obtained from 22 associate degree and 22 baccalaureate degree institutions were also analyzed to explore similarities and differences in mission, vision, learning outcomes and coursework. The following research questions were investigated in this study:

1. Is there a difference between associate degree and baccalaureate degree respiratory therapy education programs' ability to prepare graduates with the competencies required for entry into the profession in regard to:

- a. Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC graduate surveys?
 - b. Cognitive skills, psychomotor skills, affective skills and overall perceptions' of the programs ability to prepare graduates for entry into the profession as measured by the standardized CoARC employer surveys?
2. Is there a difference between graduate and employer perceptions of the educational program's ability to prepare its graduates with the cognitive skills, psychomotor skills, affective skills required for entry into the profession?
3. Is there a difference between associate degree and baccalaureate degree respiratory therapy programs' ability to prepare graduates with the competencies required for entry into the profession in terms of credentialing examination success as reported by the CoARC?
4. What are the differences between associate and baccalaureate degree programs with regards to mission, course content, and goals?

The conceptual framework underlying this study was based on the DeLapp's (1979) systems approach to education. The systems approach considered the inputs (student attributes), processes (curricula), outcomes (competencies) and the environment (stakeholders) to determine how each part impacted the development, design and evaluation of respiratory therapy education programs. In the systems approach, each part

of the system is equally important in constituting the whole which is important for improving the quality of education. According to the systems approach model, transformation of an input will provide a certain output. If the input is fixed, but the output changes, then it is possible that something within the system has changed (Huitt, 2007; McIlrath & Huitt, 1995). Therefore, if a different output from the same input is desired, then something within the system must change. In other words, the attributes of the students (inputs), qualities of the faculty, and the characteristics of the curricula affect the educational process and subsequent effectiveness of the programs ability to prepare its graduates with the competencies (outcomes) required for entry into practice. Outcomes are based on the needs of stakeholders such as hospitals, patients, students, programs and the profession.

Mishoe's (2003) foundational framework of critical thinking in respiratory care and other literature on critical thinking was used to expand on the DeLapp model as changes in the healthcare environment require critical thinking skills for all healthcare providers (Benner et al., 2010; Dewey, 1933; Johnson, 2001; Jones, 1992; Ludwig, et al, 2010; Maring & Costello, 2009; Mohr, Ingram, Hayes, & Du, 2005; VonGlaserfeld, 1989). The DeLapp-Mishoe framework was used for this study to not only determine the similarities and differences between AD and BD programs, but also to determine how different program mission, philosophies, and institutional cultures may have influenced the effectiveness of the different programs.

Inputs

As stated in Chapter 1, inputs include the characteristics, traits, skills, talents, abilities, experiences, and capabilities that students bring to the program that are assessed

prior to acceptance into a respiratory therapy education program. Therefore admission guidelines may affect whether or not the students that are most likely to succeed in the program and pass licensure examinations are accepted into the program. Findings from the document analysis revealed that AD programs utilized an open access policy and generally looked at high school GPA and college entrance examination results for admission criteria. In contrast, BD programs were more stringent and looked at pre-requisite GPA, science GPA, and letters of recommendation, personal essays, and interviews. Therefore, admission policies for BD programs appeared to be more holistic as they looked at the totality of the applicant, which may contribute to the selection of students that are more prepared for the rigorous coursework required for entry into the profession.

These findings are consistent with the research. An overview of college admission criteria in the United States found that admission criteria are closely linked to the mission and values of the institution, with a majority of community colleges (62%) endorsing open admission policies (Cabrera & Burkum, 2001). In contrast, very few (7.5%) four-year institutions had open admissions requirements. Additionally, a review of the literature found that science and prerequisite GPA are strong predictors of respiratory therapy program GPA (Gardenhire & Restrepo; 2003; Shelledy & LeGrand, 1999; Sperle, 2014). A study of senior respiratory therapy students also found a significant correlation between a vigorous science background and Watson-Glaser Critical Thinking Appraisal scores in senior respiratory therapy students (Wettstein, Wilkins, Gardner & Restrepo, 2001). Based on the literature, these findings suggest that more stringent admission criteria may have a positive impact on program outcomes by assisting with the

selection of students who are more prepared for the rigorous coursework required for entry into the profession. As respiratory therapy is a problem-solving profession requiring critical thinking skills and a rigorous science-based curriculum is indicative of a student's problem-solving ability, it is likely that the differences in entry requirements for AD and BD programs may explain why employer survey ratings for BD graduates were significantly higher than employer survey ratings for AD graduates. This finding may also explain the rationale for the higher percentage of BD graduates who attained the RRT credential as compared to graduates from AD programs as the additional admission criteria for BD programs may provide better evidence of student abilities – inputs - suggesting better outcomes.

Processes

According to the systems approach to education, processes include the components that make up or support the methodologies used to prepare students with the specific competencies required to meet educational standards (Huitt, 2007; McIlrath & Huitt, 1995). Generally speaking, program effectiveness is aimed at discovering student characteristics that are positively associated with program outcomes, usually measured as students' achievement. Process indicators (or outcomes) are malleable conditions that tend to be used to determine policies to improve education. Factors that influence RT program outcomes include the content and duration of the curriculum; the quality of program faculty and instructional methods utilized, and the quality and variety of clinical experiences available to students.

Findings from the document analysis revealed distinct differences in the mission, values, learning outcomes and coursework provided by AD and BD programs. A major

difference between AD and BD programs' was the length of study. In general, AD programs were located in technical and community colleges and were completed within a two to three year time span with general education requirements and respiratory therapy courses often taken simultaneously. On the other hand, BD respiratory therapy programs were located in universities and liberal arts colleges and were designed to take at least four years to complete. Baccalaureate degree programs commonly consisted of two years of general education requirements plus two years of respiratory therapy requirements. Document analysis also revealed that general education requirements varied, depending on the institution they are located in. For example, the mission, vision and learning outcomes of most AD programs were technically and occupationally focused with the goal of serving state and local communities. Whereas the mission, vision, and learning outcomes for most four-year colleges and universities were professionally focused with goal of providing critical thinking, leadership and life long learning skills.

These findings are consistent with the literature. Similar to respiratory therapy education, nursing education is offered at both the associated and baccalaureate degree with a majority of registered nurses (RNs) graduating from community colleges (Aiken, et al., 2001; Belgen, Vaughn, & Goode, 2001; Rambur, McIntosh, Val Palumbo, & Reiner, 2005). Both AD and BD prepared nurses sit for the same nursing boards which measure minimum technical competency for entry-level nursing practice, yet their basic preparation has many differences. Similar to respiratory therapy, most nursing BD completion programs required 24 to 32 hours of courses in ethics and humanities as well as 24 to 30 hours in advanced science courses (Meyer, 1997). Baccalaureate degree nursing programs emphasize critical thinking, health education, leadership and

professionalism whereas AD programs are less apt to include these concepts. The main advantage of AD nursing programs is that they are accessible, have low tuition costs, offer part-time and evening study opportunities and shorter lengths of programs (Meyer, 1997). Although BD nursing programs had higher tuition costs and were longer in length, research has found that nurses with baccalaureate degrees have greater opportunities for advancement into leadership positions, and into graduate programs that provide the pathway for autonomous practice (Meyer, 1997).

Differences in admission requirements for BD and AD programs may also have affected the type of student attracted to the profession. According to Dewey (1933), learning is a stimulus that is a coordinated act involving the sensory and motor actions of the student and the context in which the situation occurs (Davidson, 2001). The context includes such things as the students past experiences, the environment in which the stimulus takes place, and the student's level of engagement. As a BD involves a longer length of time and costs more than an AD, it is possible that students willing to invest more time and money on their education may be more invested in the educational process.

As the general education courses required for a baccalaureate degree typically consist of courses that provide students with a liberal arts foundation, such as courses in the humanities, natural sciences, and social sciences. Students are provided with more opportunities to develop communication skills as well as higher order thinking skills. Therefore the benefit of a BD is that it offers students the opportunity to acquire not only the knowledge and skills necessary to work independently but also the opportunity to foster life-long learning skills.

The findings from the document analysis are consistent with the literature and suggest that the additional general education and core course requirements for BD programs may provide graduates with superior critical thinking, communication, and behavioral skills than AD programs. As these skills are required to provide the high quality of care required in today's complex healthcare setting, differences in AD and BD curricula may also explain the higher employer survey ratings for BD graduates as compared to AD graduates in the cognitive, psychomotor, and behavioral domains. They may also explain the higher percentage of BD graduates achievement of the RRT credential as compared to AD graduates.

Outcomes

Program outcomes are statements that describe what learners will be able to know and do after graduation from an educational program (Bresciani, 2006). Respiratory therapy program outcomes are measured by the attainment of certain standards mandated by the Commission on Accreditation for Respiratory Care. CoARC evaluates multiple outcomes, including graduate performance on the credentialing examination, programmatic retention/attrition, job placement, cognitive, psychomotor, and behavior skills for assessing accreditation status (CoARC, 2013). All accredited respiratory therapy programs are required to report results from the aforementioned for annual review. (CoARC, 2010). Program outcomes examined in this study included graduate and employer surveys and graduate performance on RRT credentialing examinations.

Graduate Surveys

Results from the graduate surveys revealed that AD and BD graduates are satisfied with their education preparation (mean ratings 4.52 – 4.66). However, the study

found that baccalaureate degree graduates ratings were slightly higher than associate degree graduate ratings in the cognitive and psychomotor domains. There was also a difference between the two program types on the mean rating for the single item that asked graduates to rate the overall quality of their preparation for entry into the profession. Although no studies comparing AD and BD graduate satisfaction with their education preparation exist for RT programs, a recent survey of 1,001 students graduating from college in 2015 found that 80% of graduates reported that they believed they were well prepared to enter the workforce (Hart Research Associates [HRA], 2015). Therefore, the results from the graduate surveys in this study are consistent with the literature.

A search of the nursing literature based on education level and job satisfaction revealed that nurses with baccalaureate or graduate degrees reported greater job satisfaction than those with an associate degree. A 2010 HRSA survey of registered nurses found that 87.3% of registered nurses (RNs) with graduate degrees were satisfied with their job, whereas 81.3% of baccalaureate degree RNs and 78.6% of associate degree RNs reported satisfaction with their jobs.

Research has also shown that nurses with baccalaureate or graduate degrees often work in the areas of management, education, and anesthesia or as physician extenders, and therefore work more autonomously and typically earn higher salaries (CoBGRTE, 2014). These findings suggest that job satisfaction may be related to autonomy and salary. These findings are consistent with the trends in higher education which has shown that individuals with higher levels of education are more likely to be satisfied with their jobs and report higher earnings and claim that their work gives them a sense of accomplishment (Baum, Kurose, & Ma, 2013). The findings that BD prepared RT

graduates had slightly higher ratings than their AD counterparts in the constructs of cognitive and psychomotor skills may reflect that they are more prepared to move into management and leadership areas.

The state of the current respiratory therapy education curriculum was analyzed and discussed during three conferences sponsored by the AARC. The overarching goal of these conferences was to identify potential new roles and responsibilities for respiratory therapists in the year 2015 and beyond, and to suggest the education, training, and competency-documentation required to assure safe and effective practice. Findings from the 2015 and Beyond Conferences indicated that the current education structure requiring the minimum of an associated degree for entry into the profession does not adequately prepare practitioners for advanced level positions such as management, education, or research. Today's practitioners must be skilled in case management, evidence based medicine, management, leadership, research skills as well as the fundamentals of education in order to be highly functional members of the health care team. Currently there is little room within the associate level curriculum to teach in-depth skills such as the practice of evidence-based medicine, skills to critically appraise peer reviewed literature, and disease and case management in Asthma and COPD. As a result, one of the core recommendations from the 2015 and beyond conferences included transitioning the entry level to be a baccalaureate degree (Barnes, Kacmarek, Kageler, Morris, and Durbin 2011).

Employer Surveys

Multivariate differences were found in mean ratings across employer survey items between associate degree and baccalaureate degree graduates in the cognitive,

psychomotor and affective domains. Employers rated baccalaureate degree graduates higher than associate degree graduates in the cognitive domain (mean scores 4.442 and 4.256 respectively) the psychomotor domain (mean scores 4.508 and 4.308 respectively) and the affective domain (mean scores 4.642 and 4.496 respectively). Baccalaureate degree employer survey ratings were also slightly higher than associate degree employer ratings on the mean rating for the single item that asked graduates to rate the overall quality of their preparation for entry into the profession.

These findings are consistent with the literature on employer's preferences regarding the education of respiratory therapists. A study by Becker (2003) found that 54.2% (n=221) of directors from large (>345 bed) hospitals preferred to hire BD prepared graduates, whereas 31.6% of director's from small hospitals preferred to hire AD graduates. The study also found that the average orientation time for new employees ranged from 0 to 52 weeks, with a median orientation time of 4.0 weeks for baccalaureate and 6.0 weeks for associate degree graduates. Another study by Kacmarek, et al (2012) found that 270 (41.8%) of department managers surveyed indicated that a baccalaureate or master's degree in respiratory therapy should be required to qualify for a license to deliver respiratory care whereas a majority (70.1%) were in favor of their staff earning a baccalaureate or graduate degree in order to progress in the profession.

A 2011 survey of respiratory therapy education program directors had similar findings. A majority of (87.0%) of BD program directors believed that a baccalaureate or master's degree should be the minimum education level required for entry into practice, whereas a majority (81.3%) of AD program directors believed that the associate degree should remain the requirement for entry into the profession (Barnes, Kacmarek, &

Durbin, 2011). The same study also found that a majority of both BD (100%) and AD (65.8) program directors believed that a baccalaureate or master's degree should be required for future graduates after they have begun practice (Barnes, Kacmarek, & Durbin, 2011).

A growing body of evidence has consistently shown better outcomes such as safer practice environments, lower rates of mortality and hospital-acquired infections and decreased failure to rescue rates are found at hospital's employing a higher percentage of baccalaureate prepared nurses (Aiken et al., 2003; Kendall-Gallagher; Aiken, Sloane, & Cimiotti, 2011; McHugh et al., 2013; Tourgeau et al., 2007). In an era of medical cost containment, hiring practices and methods that improve patient outcomes and decrease health care costs are highly valued (Kaiser Family Foundation, 2013). Studies from other health care disciplines suggest that graduates with advanced degrees are more likely to demonstrate professional behaviors, critical thinking skills, and effective communication skills (Blegen, Vaughn, & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994). Research has also found that employees with more formal education have better abilities to deal with unanticipated (non-routine problem-solving) events than workers with little formal education (Levy & Murnane, 2001). Therefore results from employer surveys suggest that moving to the baccalaureate degree for entry into the profession of respiratory therapy may produce similar effects.

Because employers are one of the major stakeholders affecting the educational outcomes of respiratory therapy programs, results from the employer survey ratings suggest that the current education structure requiring the minimum of an associated degree may not be sufficient for entry into the profession. Results of the document

analysis comparing AD and BD program curricula suggest that AD programs may not adequately prepare practitioners for advanced level positions such as management, education, or research. Additionally, research has shown that there is little room within the associate level curriculum to teach in-depth skills such as the practice of evidence-based medicine, skills to critically appraise peer reviewed literature, and disease and case management in Asthma and COPD (Barnes, Kacmarek, & Kageeler et al., 2011). Therefore processes requiring a baccalaureate degree for entry into the profession may provide outcomes that maximize patient access to quality respiratory therapy throughout the country.

Graduate vs. Employer Surveys

Multivariate differences were found in mean ratings comparing employer and graduate survey items in the cognitive, psychomotor and affective domains using data from all three data sets (AD graduate vs. employer surveys, BD graduate vs. employer surveys, and combined AD & BD graduate vs. employer surveys). Post hoc pairwise comparisons also revealed differences between graduate and employer surveys in the cognitive and psychomotor domains. Mean ratings were lower for employer surveys compared to graduate surveys in the cognitive, psychomotor, and affective domains in all three data sets. Mean ratings were also lower for employer surveys compared to graduate surveys in the AD graduate vs. employer survey data set and the combined AD & BD graduate vs. employer survey data set in the affective domain; however the results were not significant. Based on these findings, it becomes clear that employers evaluate graduate competencies from a different viewpoint than graduates. Although employer and graduate ratings are not directly comparable, they both can be used to gain a clearer

picture of student outcomes and may affect positive change for education programs as well as the profession.

The differences between employer and graduate survey ratings found in this study are consistent with the literature. Research has shown that there is a notable gap between graduate and employer perceptions about the level of preparedness of recent graduates (HRA, 2015; Mulhere, 2015; Zimmer, 2014). A survey of 2,001 college students and 1,000 hiring managers found that students overestimated their oral and written communication skills and their decision-making skills (Zimmer, 2014). An online survey of 455 university graduates, 158 community college graduates and 400 employers also found that 74% of graduates perceive that their colleges/universities prepared them with the skills needed for entry-level positions whereas only 42% of employers perceived that colleges and universities prepared graduates for entry into the workforce (HRA, 2015). Based on the literature, the gap between employer and graduate perceptions indicate the need for higher education institutions to better prepare graduates with the communication and decision-making skills required for entry into the workforce.

Results from the comparison between employer and graduate surveys found that employer ratings were higher than graduate ratings in the affective domain for baccalaureate degree programs while employer ratings were lower than graduate ratings in the affective domain for associate degree programs. The reason for this finding is unclear however; it could be an issue of over-confidence on the part of the associate degree graduate and lack of confidence on the part of the baccalaureate degree graduate. On the other hand, the findings could be interpreted to mean that baccalaureate degree graduates are more sensitive to the professional aspects or *soft skills* that are required for

the job and perceive the need for more experience to get to that level. It is also possible that employers of baccalaureate degree graduates were looking for these soft skills and were satisfied with the affective attributes of these graduates. Findings from the document analysis comparing AD and BD curricula and results from the graduate and employer surveys that found significantly higher ratings for BD prepared graduates in both the graduate and employer surveys, suggest that the additional general education and core course requirements for BD programs may better prepare graduates for entry into the profession.

The ongoing controversy concerning entry-level education for respiratory therapy practice has produced discord between AD and BD faculty views on which learning environment affords the best opportunity for graduates to develop the skills needed for entry into the profession. Thus, it is also possible that the results of the CoARC surveys were due to program faculty bias. Associate degree programs may feel the need to prove that they are capable of providing their graduates with the professional competence expected of graduates. As a result, AD graduates may overestimate their educational preparation in the affective domain. On the other hand, BD educator may have such high professional expectations for their graduates that BD graduates may underestimate their educational preparation in the affective. Nevertheless, the findings from this study provide noteworthy evidence that graduate's perceive they were more prepared to enter the workforce than do their employers. Therefore, findings from employer surveys may provide a more realistic rationale for moving to the BD for entry into the profession than graduate surveys.

Critical Thinking Skills

Research has shown that baccalaureate and graduate prepared health professionals are more proficient in affective skills such as professionalism, critical thinking, and effective communication (Belgen, Vaughn, & Goode, 2001; Johnson, 1988; Warren & Pierson, 1994). Research has also shown that clinical education provides the means for imparting contextual knowledge, technical expertise, and behavioral attributes to the student (Cullen, 2005). Hence, direct patient care allows students to apply the theoretical knowledge they learned in the classroom to a real-life problem. Currently CoARC standards do not dictate the number of clinical hours that programs must incorporate into their curriculum. Existing standards simply require programs to “document that clinical education experiences at each clinical site are of sufficient quality and duration to enable students to meet program goals and acquire competence needed for clinical practice” (CoARC, 2010, p. 26).

A survey of 52 baccalaureate and graduate respiratory therapy program directors found that the mean amount of time students spent in clinical rotations was 937.1 (\pm 239.0) hours (Barns & Ward, 2009). No research examining clinical hour requirements specifically for associate degree programs has been reported in the literature; therefore, the question remains as to whether the time constraints of a two year program may limit time available to ensure sufficient quality and duration of clinical education. As clinical experience is the foundation for bridging the gap between theory and practice (Brenner et al., 2010), the amount of time students spend in the patient care setting is a crucial part of their educational experience.

A review of the literature also found that transformative experiences such as improved critical thinking and decision-making skills were reported by nurses who returned to school to complete a baccalaureate degree in nursing (Delaney & Piscopo, 2007; Leonard, 2003; Lillibridge & Fox, 2005; Rush, Waldrop, Mitchell, & Dyches, 2005). Although the nurses in these studies returned to school as skilled, knowledgeable and professional practitioners, they reported growing beyond their expectations in areas of knowledge and professionalism (Delaney & Piscopo, 2007; Leonard, 2003; Lillibridge & Fox, 2005; Rush, Waldrop, Mitchell, & Dyches, 2005; Zuzelo, 2001). These nurses also reported that returning to school to complete a BD in nursing directly benefited their patients by providing them with the means to become more effective change agents and patient advocates (Delaney & Piscopo, 2007). Therefore advancing to the BD for entry into the profession may likely have the same results.

Credentialing Success

Mann-Whitney two-sample tests revealed a significant difference between associate degree and baccalaureate degree credentialing success; however the effect size was small. This finding is consistent with the literature. The nursing literature has shown that baccalaureate prepared nurses pass the RN board examinations at higher rate than associate degree graduates, however, the findings were not significant (NCSBN,2012; Rosseter, 2014). A review of the literature comparing AD and BD NBRC examination scores found significantly higher BD examination scores compared to AD examination scores (Meyers-Moss, 2012; Shaw and Traynor, 2010). Although BD graduates passed RRT board examinations at a statistically significant higher rate, the effect size was small; therefore the results from these studies should be interpreted with caution. Both the

Meyers-Moss and Shaw studies examined RRT pass rates for all graduates, however, neither took into account how many attempts it took for the graduates pass. Therefore, further research comparing AD and BD first time pass rates on the RRT examinations is needed to determine if the effect size would be larger in this population.

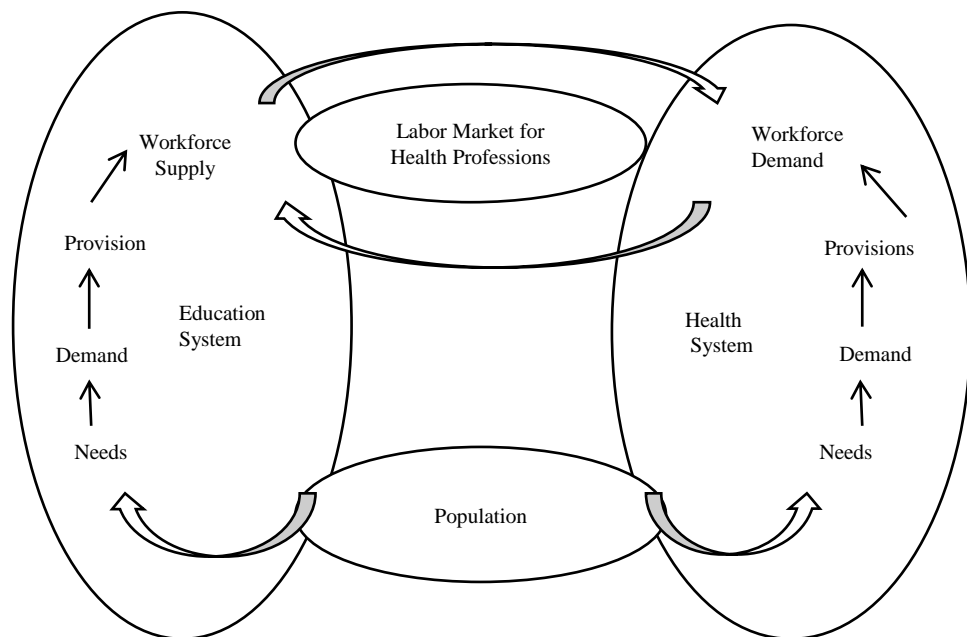
Environment

As stated in chapter one, the environment includes variables that can influence and modify students and learning processes that may or may not be controlled by the educators or the program (McIlrath &Huitt, 1995; Huitt, 2007). For the purpose of this study, environmental variables included institutional missions and values, accreditation standards, and expectations of employers, the profession, and society.

As all health professionals are subject to educational processes aimed at developing outcomes such as the knowledge, skills, and attitudes needed to improve the health of patients and populations, there is a fundamental link between professional education and health. For this reason, the Commission on Education of Health Professionals (CEHP) for the 21st Century developed a framework to help better understand the complex interactions between the education system and the health system (Frenk, et al. 2010).

The CEHP Systems Framework (Figure. 3) perceives the population as the base and driver of both the education and health systems (Frenk, 2010). In this framework, society generates needs for both health and education, which in turn may be translated into the demand for education and health services. Ideally in this systems approach, educational institutions determine the type of professionals (outcomes) that are produced in response to labor market signals generated by health care institutions that respond to

the needs of the population. As our nation’s healthcare system has consistently added to the competencies required to prepare respiratory therapists for entry into the profession, RT education programs must respond to these environmental stimuli by expanding their curriculums (processes) in order to prepare students for these new responsibilities (Barnes, et al., 2010; Barnes, Kacmarek, & Durbin, 2011; Kacmarek, et al., 2009). Therefore, using DeLapps (1979) systems framework for education, environmental factors are affecting the outcomes (outputs) required to prepare students (inputs) for entry into the profession. As a result, the processes (curriculum) must change to meet the needs of society.



*Figure 3. Systems Framework. Adapted from “Health professionals for a New Century: Transforming Education to Strengthen Health Systems in and Interdependent World,” by Frenk, J., et al., 2010, *The Lancet*, 376, p. 1927.*

An example of these environmental forces at work is the recent push for a more educated healthcare workforce in order to better meet complex patient's needs.

Motivating factors for this push are likely related to the results of several studies that have consistently linked an increased proportion of BD prepared RNs in acute care hospitals with significantly decreased patient mortality rates (Aiken, Clarke, Cheung, Sloane & Sliber, 2003; Estabrooks, Midodzi, Cummings, Ricker & Giovanetti, 2005; Tourangeau, et al., 2006). The data from these studies is compelling and cannot be ignored as these studies examined close to 300 hospitals, about 300,000 patients and almost 23,000 nurses.

A more sobering analysis comes from a report by the Institute of Medicine's (IOM) "*To Err is Human: Building a Safer Health System*," that found that nearly 98,000 patients die needlessly in the United States each year due to medical errors (Kohn, Corrigan, & Donaldson, 1999). The American Association of Colleges of Nursing (2007) found that most of these errors were caused by system and process problems, therefore, it seems likely that healthcare practitioners with a BD or higher may be better prepared to implement solutions due their more extensive training that emphasizes critical thinking, leadership and management skills. The current body of knowledge examining the issue of medical errors and the education needed to ensure health care practitioners are prepared and trained to prevent errors is evolving. This study comparing AD and BD programs adds to the body of knowledge by providing additional evidence to support increasing the education requirements for preparing graduates for entry into the RT profession.

In summary, differences in the mission, values, learning outcomes and coursework provided by AD and BD programs provide evidence that inputs (students)

and processes such as: content and duration of the respiratory therapy curriculum; the quality of program faculty and instructional methods utilized; and the quality and variety of clinical experiences available to students have a substantial influence on program outcomes. As educational outcomes are linked to environmental variables such as the healthcare system, it is vital that RT education programs are indeed providing students with the competencies required to meet the challenges they will face in terms of providing better services and consequent improvements in the health of patients and the population. There is a recognized need for respiratory therapists to be life-long learners and critical thinkers who are able to address the needs of patients with intellectual curiosity and not by the rote memorization of facts and practices that were acceptable in the past (Barnes, Kacmarek, & Kageeler et al., 2011). “Attainment of specific competencies not time or academic turf protection must be the defining feature of the education and evaluation of future healthcare professionals” (Frenk, et al. 2010, p.1943).

Implications for Practice

This study extends our understanding of the education needed for entry into the respiratory therapy profession and has implications for stakeholders. Education programs, students, accrediting bodies, employers, the profession, and society, all have the expectation of high quality graduates entering the profession. Therefore, it is important to look back at the difference in the expectations of the respiratory therapy graduates of the past compared to the expectations of the respiratory therapy graduate today. While the respiratory therapists of the past received largely technical training, the respiratory therapist of today must be proficient in the monitoring of sophisticated equipment that uses complex algorithms to ventilate patients who are unable to breathe on their own. As

such, respiratory therapists must have an in-depth knowledge and understanding of the cardiopulmonary implications of mechanical ventilation as well as the critical-thinking skills required to evaluate and assess the patient's response to the ventilator. Today's RT must be able to rapidly identify problems and make adjustments to therapy to match the unique requirements of patients who present with various pathologies. In order to do this, they must also have an in-depth understanding of the evidence that supports the application of and monitoring of mechanical ventilation as well as the ability to communicate effectively and work as part of the healthcare team. The competencies required to function in today's complex healthcare environment continue to expand in all aspects of patient care, especially in the critical care environment, where RTs are taking on the role of the expert consultant. The advanced roles and responsibilities, such as critical thinking, leadership and communication skills, required in today's complex health arena suggests the associated degree may no longer be sufficient for preparing students with the competencies required to meet the challenges they will face upon entry into the profession. Research has shown that there is little room within the associate level curriculum to teach in-depth skills such as the practice of evidence-based medicine, skills to critically appraise peer reviewed literature, and disease and case management in Asthma and COPD (Barnes, Kacmarek, & Kageeler et al., 2011). Therefore, education programs in respiratory care need to expand to the baccalaureate level.

The respiratory therapy professional identity is currently limited by the fact that we have a low expectation for entry into the profession which could lead to the inability to attract high-quality students into the profession, especially given the fact that the majority of other allied health professions have raised their entry-level education

standards. Findings from this study suggests that the BD curricula, with an emphasis on research, theory, and leadership, better prepares graduates to respond to the ever-changing healthcare environment which serves the best interest of stakeholders. An increase in BD prepared RTs would also create a workforce poised to attain the master's and doctoral degrees needed to serve as researchers and educators.

While the results of this study provided insight into the advancing level of education needed to prepare RT students to practice safely and effectively in today's complex health care environment, a majority of RT education programs in the United States are still located in community and technical colleges. As such the movement to the BD for entry into the profession will be a daunting task without some sort of transitional process for current AD programs. Currently there are a number of consortia agreements between colleges and universities to award the BD in respiratory therapy. Several accredited RT programs also have online curriculums designed for associate degree RT students to compete the requirements for the baccalaureate degree (CoBGRTE, 2013) and some community colleges are now able to award baccalaureate degrees (American Association of State Colleges and Universities [AASCU], 2010). In fact many states, such as Arkansas, California, Colorado, Florida, Hawaii, Illinois, Indiana, Louisiana, Michigan, Minnesota, North Dakota, New Mexico, Nevada, New York, Oklahoma, Texas, Utah, Vermont, Washington, Wisconsin, and West Virginia have received authorization by state governing bodies to allow state colleges to confer baccalaureate degrees (AASCU, 2010). This trend should make it easier for RT programs located in these states to begin offering baccalaureate degrees. The AARC has also developed a

tool-kit to assist programs with the transition from an associate degree to a baccalaureate degree.

Strengths and Limitations

A major strength of the study was that it was the first study designed to look at outcomes other than pass rates on national board examinations to assess the effectiveness of respiratory therapy education programs. As environmental factors such as the healthcare industry have been and will continue to impact the competencies required to practice safely and effectively in the patient care setting, programs are challenged to modify their curricula to meet the demands of the industry. The ability to make sound clinical judgments recommend appropriate therapy and work collaboratively with other member of the healthcare team as well as the attainment of excellent technical and troubleshooting skills have become the standards of care required to work in today's complex healthcare system. In order to assess these competencies, one needs to evaluate the knowledge, skills, and abilities represented by those behaviors in the actual practice environment. Another major strength of the study is that is provided reliability and validity data on the standardized graduate and employer survey instruments.

The main limitation of this study was that it used a convenience sample of AD and BD programs that used the DataArc Education Service Provider to collect graduate and employer survey data. Therefore the results from this study may only be generalizable to the programs studied. However, the sample of programs used for this study consisted of 16 (15%) programs offering the BD and 88 (85%) programs offering the AD and therefore was representative of the population of respiratory therapy programs in the US. Another limitation of the study was that all program, student, and

employer identification was removed from the surveys to protect confidentiality. Therefore individual student, program, and employer demographic information was unavailable for analysis. However, a recent study by Becker and Nguyen (2014) found that current entry-level associate and baccalaureate degree graduates have similar gender and race proportions.

Implications for Research

One anticipated area for further research is the impact of the implementation of these non-traditional models for baccalaureate degree education in the respiratory therapy profession. There are numerous non-traditional programmatic models that colleges can use to transition to the BD: the Articulation Model, the University Center Model, and the Community College Baccalaureate Model (Floyd, Skolnik, & Walker, 2005). The articulation model consists of a two-plus-two model whereby students complete two years at the community college and transfer to a four-year institution to complete their degree. This model ensures acceptance of the first two years by four-year institutions and is vital to the transfer function. In the University Center Model, a university confers the BD in partnership with a two-year institution. A consortium agreement, where a university confers a degree in partnership with another institution such as a community college, is typically involved in this model. In the Community College Baccalaureate (CCB) model, the community college confers the BD without partnering with a four-year institution.

Different program models, philosophies, and institutional cultures may influence how baccalaureate completion programs are designed and implemented. Comparing how these differences will impact the institutions, students, and the practice of respiratory

therapy is an area for further research. Additionally, if implemented, will these programs meet the future demands of the profession? Future research could also examine the quality of students from these non-traditional models and compare them to the traditional baccalaureate entry-level model.

Conclusion

The continued growth and advancement of the profession and the expectations placed on respiratory therapists require that every respiratory therapist demonstrate an advanced level of critical thinking, assessment and problem solving skills. These skills are essential in today's health care environment to not only improve quality of care, but also to reduce inappropriate care, readmissions and to control costs. Results from the study revealed differences between graduate and employer perceptions of BD and AD programs ability to prepare graduates with the knowledge and skills required to enter practice. Differences in the content of AD and BD programs were also found.

The ongoing controversy concerning entry-level education for respiratory therapy practice is based on whether or not baccalaureate degree entry-level education is warranted if graduates from associate and baccalaureate degree programs possessed the same level of clinical technical proficiency. As the curricular requirements to prepare respiratory therapists will continue to expand, it will become more difficult to prepare entry-level therapists with the knowledge, skills and attributes needed to enter today's workforce at the current associate degree entry-level. Thus, the results of this study support the "2015 and Beyond" recommendation that the BD be the minimum entry-level education required for entry into the profession.

APPENDICES

APPENDIX A

GRADUATE SURVEY



NOTE: Completion of this survey is required as part of outcomes assessment by the program's accreditation body (CoARC).

The purpose of this survey is to help faculty evaluate the Program's success in preparing graduates to function as competent respiratory therapists. Compiled data from all returned surveys will be used to evaluate program quality; data from individual surveys will be held in strict confidence.

INSTRUCTIONS: Consider each item separately and rate it independently of all others. Check the rating that indicates the extent to which you agree with each statement. Please do not skip any rating.

**5 = Strongly Agree 4 = Generally Agree 3 = Neutral (acceptable)
2 = Generally Disagree 1 = Strongly Disagree**

I. KNOWLEDGE BASE (Cognitive Domain)

THE PROGRAM

- | | | | | | |
|--|---|---|---|---|---|
| A. Taught me the professional knowledge base required to function effectively on the job. | 5 | 4 | 3 | 2 | 1 |
| B. Taught me the general medical knowledge base required to function effectively on the job. | 5 | 4 | 3 | 2 | 1 |
| C. Taught me to interpret pertinent clinical information from medical records and physical findings. | 5 | 4 | 3 | 2 | 1 |
| D. Prepared me to recommend appropriate therapeutic interventions based on physiological data and physical findings. | 5 | 4 | 3 | 2 | 1 |
| E. Trained me to make sound clinical judgments. | 5 | 4 | 3 | 2 | 1 |

II. CLINICAL PROFICIENCY (Psychomotor Domain)

THE PROGRAM

- | | | | | | |
|--|---|---|---|---|---|
| A. Helped me become proficient in the clinical skills required on the job. | 5 | 4 | 3 | 2 | 1 |
| B. Taught me to perform patient assessment accurately and efficiently. | 5 | 4 | 3 | 2 | 1 |

- C. Taught me to perform the therapeutic procedures and modalities required on the job. 5 4 3 2 1
- D. Taught me to perform the diagnostic procedures required for the job. 5 4 3 2 1

III. BEHAVIORAL SKILLS (Affective Domain)

THE PROGRAM

- A. Helped me develop effective oral communication skills. 5 4 3 2 1
- B. Helped me develop effective written communication skills. 5 4 3 2 1
- C. Encouraged me to conduct myself in an ethical and professional manner. 5 4 3 2 1
- D. Taught me how to manage my time effectively in the clinical setting. 5 4 3 2 1
- E. Taught me to respect the beliefs and values of persons, regardless of cultural background, religion, age or lifestyle. 5 4 3 2 1

5=Excellent 4=Above Average 3=Average 2=Below Average 1=Poor

IV. OVERALL RATING OF THE PROGRAM: 5 4 3 2 1

Thank You!

APPENDIX B

EMPLOYER SURVEY



NOTE: Completion of this survey is required as part of outcomes assessment by the program's accreditation body (CoARC).

The purpose of this survey is to help faculty evaluate the Program's success in preparing graduates to function as competent respiratory therapists. Compiled data from all returned surveys will be used to evaluate program quality; data from individual surveys will be held in strict confidence.

INSTRUCTIONS: Consider each item separately and rate it independently of all others. Check the rating that indicates the extent to which you agree with each statement. Please do not skip any rating.

**5 = Strongly Agree 4 = Generally Agree 3 = Neutral (acceptable)
2 = Generally Disagree 1 = Strongly Disagree**

I. KNOWLEDGE BASE (Cognitive Domain)

THE GRADUATE

- | | | | | | |
|---|---|---|---|---|---|
| A. Has a professional knowledge base. | 5 | 4 | 3 | 2 | 1 |
| B. Has a solid general medical knowledge base.. | 5 | 4 | 3 | 2 | 1 |
| C. Accurately interprets pertinent clinical information from medical records and physical findings. | 5 | 4 | 3 | 2 | 1 |
| D. Recommends appropriate therapeutic interventions based on physiological data and patient assessment information. | 5 | 4 | 3 | 2 | 1 |
| E. Makes sound clinical judgments. | 5 | 4 | 3 | 2 | 1 |

II. CLINICAL PROFICIENCY (Psychomotor Domain)

THE GRADUATE

- | | | | | | |
|---|---|---|---|---|---|
| A. Is proficient in the clinical skills required on the job. | 5 | 4 | 3 | 2 | 1 |
| B. Can efficiently perform an overall patient assessment. | 5 | 4 | 3 | 2 | 1 |
| C. Completely performs the therapeutic procedures and modalities required on the job. | 5 | 4 | 3 | 2 | 1 |
| D. Completely performs the diagnostic procedures required for the job. | 5 | 4 | 3 | 2 | 1 |

**III. BEHAVIORAL SKILLS (Affective Domain)
THE GRADUATE**

A. Has effective oral communication skills.	5	4	3	2	1
B. Has effective written communication skills.	5	4	3	2	1
C. Behaves in an ethical and professional manner.	5	4	3	2	1
D. Functions effectively as a member of the healthcare team.	5	4	3	2	1
E. Accepts supervision and works effectively with supervisory personnel.	5	4	3	2	1
F. Displays respect for beliefs and values of all persons regardless of cultural background, religion, age or lifestyle.	5	4	3	2	1

5=Excellent 4=Above Average 3=Average 2=Below Average 1=Poor

IV. OVERALL RATING OF THE PROGRAM: 5 4 3 2 1

Thank You

APPENDIX C

Associate Degree (N=21)	Baccalaureate Degree (N = 22)
GateWay Community College (AZ)	University of Arkansas*
Pueblo Community College (CO)	Loma Linda University (CA)*
Manchester Community College (CT)	Nova Southeastern University (FL)*
Florida Southwestern State College*	Armstrong State University (GA)*
Valencia College (FL)*	Georgia Regents University*
Middle Georgia State College*	Georgia State University*
Springfield Technical Community College (MA)	Boise State University*
Northland Community College (MN)	Indiana Respiratory Therapy Education Consortium*
Ozarks Technical Community College (MO)	University of Kansas Medical Center*
Great Falls College (MT)	Bellarmino University (KY)*
Nebraska Methodist College*	Louisiana State University Health Science Center*
Central New Mexico Community College	University of Missouri*
Nassau Community College (NY)	Kettering College (OH) 3-yr BS program*
Gannon University (PA)*	University of Toledo (OH)*
Gwynedd-Mercy College (PA)*	Youngstown State University (OH)*
Trident Technical College (SC)	Oregon Institute of Technology*
Dakota State University (SD)*	Baptist College of Health Sciences (TN)*
Chattanooga State Community College (TN)	East Tennessee State University*
Weber State University (UT)*	Midwestern State University (TX)*
Virginia College (VA)	Texas Southern University*
Highline College (WA)*	Texas State University*
Casper College (WY)	Shenandoah University (VA)*

**Institutions that offer a baccalaureate completion program*

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